

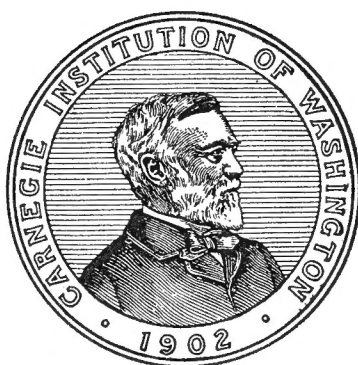
BOTANY OF THE MAYA AREA
MISCELLANEOUS PAPERS
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BOTANY OF THE MAYA AREA

MISCELLANEOUS PAPERS

I - XIII



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BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

I

**A METHOD OF PROCEDURE FOR FIELD WORK IN
TROPICAL AMERICAN PHYTOGEOGRAPHY BASED
UPON A BOTANICAL RECONNAISSANCE IN PARTS
OF BRITISH HONDURAS AND THE PETEN
FOREST OF GUATEMALA**

By HARLEY HARRIS BARTLETT

With fourteen plates

[Issued July 10, 1935]

A METHOD OF PROCEDURE FOR FIELD WORK IN TROPICAL AMERICAN PHYTOGEOGRAPHY BASED UPON A BOTANICAL RECONNAISSANCE IN PARTS OF BRITISH HONDURAS AND THE PETEN FOREST OF GUATEMALA¹

INTRODUCTION

The modern point of view in botanical survey has hardly been applied in the tropics. There is very little literature dealing with the definition and analysis of tropical plant associations except such relatively simple ones as the strand of the mangrove belt, and there are no ecological or phytogeographical publications for any restricted tropical area which give us such definite information as we have for many temperate regions. Scottsberg² recently stated:

"As far as I know, not one description in a modern sense of a rich tropical association exists. Possibly such detailed descriptions are not necessary; we may be entitled to leave out many of the components and still be able to separate the associations from each other. This is perhaps what we ought to find out first of all."

As a matter of fact some observers have practically denied that rich tropical floras can be divided into definable plant associations. Gleason³ has said that the definition of an association in terms of character species is impracticable or even impossible. He states that in a tropical forest a single hectare may contain a hundred species of trees, not one of which can be found in an adjoining hectare. Nichols⁴ has questioned this statement and quotes Whitford to the effect that he did not know of a single instance where quantitative measurements have been made of the tree population in the tropics and where this statement of Gleason's would hold true unless for plots which presented radically different environmental conditions. Nichols also quoted Shantz, who has had broad experience in Africa, to similar effect.

¹Paper No. 406 from the Department of Botany and the Herbarium of the University of Michigan. Based upon field work of the Maya Expedition of 1931, under auspices of the Department of Historical Research, Carnegie Institution of Washington, the Herbarium and the Museum of Zoology, University of Michigan.

²Carl Scottsberg, *Plant communities of the Juan Fernandez Islands*, Proc. Internat. Cong. Plant Sci., Ithaca, N. Y., vol. 1, 565-574, 1929. (See p. 573.)

³H. A. Gleason, *The individualistic concept of the plant associations*, Bull. Torr. Bot. Club, vol. 53, 7-26, 1926.

⁴G. E. Nichols, *Plant associations and their classification*, Proc. Internat. Cong. Plant Sci., Ithaca, N. Y., vol. 1, 629-641, 1929.

The most informative studies that have been made in rich tropical forests seem to be those of Whitford,¹ Brown and Matthews,² and Brown³ in the Philippines. Since Whitford has had especially long experience in tropical forest ecology and had made quantitative studies of the tree population in many places in the tropics, the following opinion of his, quoted by Nichols, is particularly significant:

"I recall one instance in the Philippines where strip surveys were made in a forest covering thirty square miles and where practically every hectare measured showed a repetition of the same species. They were mixed, to be sure, with a large number of other species which occurred much more rarely; but even such species, upon careful examination, were found to be represented by small specimens in the adjacent hectares. To the average botanist entering a tropical forest all seems confusion, and yet, with a knowledge of the species and quantitative studies of the composition, tropical forests can be classified by associations and can be designated by the generic and sometimes the specific names of the predominating trees."

The writer has made no quantitative studies, but as a collector his experience is wholly in accord with Whitford's. Nevertheless there is every reason for believing that Gleason's statement might be found entirely true at many places in the tropics where cleared land has been abandoned and covered by a relatively uniform secondary forest of a few species which are so rare as to be easily overlooked even if they occur in adjoining primary forest. In Sumatra, for instance, old secondary forest ("beloekar toewa") only very slowly attains the climax composition of virgin forest ("rimba raja"), and certain it is that a small patch of the latter surrounded by second growth might actually have a hundred species that had not entered the secondary forest. The latter, even if merely a successional stage, is a long-enduring and definite plant association and has to be treated as such. Ecologists who have worked in the Malayan region have indeed done so. Brown, for instance, divides the vegetation of Mount Maquiling in Luzon into (1) parang vegetation (secondary forest and abandoned clearings); (2) dipterocarp forest (subdivided into (a) virgin forest, and (b) culled forest; (3) midmountain forest, with two subdivisions (a) the *Quercus-Neolitsea* association, and (b) the *Astronia rolfei* association; (4) the mossy forest. Here we have a very serviceable classification of the vegetation which is none the less useful because of the obvious fact that some of the associations are successional phases and that there must be much intergradation.

¹ H. N. Whitford, *The vegetation of the Lamao Forest Reserve*, Philip. Jour. Sci., vol. 1, 373-431, 637-682, 1906.

Studies in the vegetation of the Philippines. The Composition and volume of the dipterocarp forests of the Philippines, Philip. Jour. Sci., Bot., vol. 4, 699-723, 1909.

The forests of the Philippines, Philip Bur. Forestry. Bull. 10,² 94; 10,² 113, 1911.

² W. H. Brown, and D. M. Matthews, *Philippine dipterocarp forests*, Philip. Jour. Sci. 9 Par. A: 413-561, 1914.

³ W. H. Brown, *Vegetation of Philippine mountains*, Manila, 1919.

A POINT OF VIEW AND A METHOD OF PROCEDURE FOR RAPID FIELD WORK IN TROPICAL PHYTOGEOGRAPHY

The experience of tropical botanists with the highly complex flora of the Philippines indicates that definite plant associations do exist in the tropics and may (with certain practical limitations) be defined. Success in the rapid study of any new area by a non-resident botanist will depend upon getting a proper systematic acquaintance with the flora while in the field, and such an acquaintance, the writer believes, is generally most advantageously obtained from the natives of the country. Their knowledge is often found to be surprisingly extensive when scientifically checked. Folk science takes account not only of a great number of plant species, but also of plant associations. Its utilization by a botanist requires, in the first place, that he must for a time subordinate his naturally greater interest in species found in flower or fruit to an interest in prevalent plants for which he can learn the vernacular names, regardless of whether or not they can be found in determinable condition. Eventually they will be found fertile, but until they are it will be necessary for the botanist to have names for them and to recognize them in a sterile state as the natives do. Otherwise he can not take notes. Nothing is easier, as the writer can affirm from his own experience, than to glean from a tropical forest a few species, possibly including rare and interesting ones without being able to make a single useful note about the plant association as a whole. Of course every isolated fact that can be acquired is valuable, and therefore I do not wish in the slightest degree to detract from the value of collecting specimens of whatever is determinable, even one or two species whenever it is not possible to work more thoroughly. I do, however, wish to emphasize the importance, in a genuine biological survey, of recognizing the plant associations.

A botanist working in a new tropical area is seldom so fortunate as to recognize in the field more than a small proportion of the species. If the flora is complex he is confronted with a multitude of species which are not only new to him, but which flower and fruit only at some other season than that of his visit, or perhaps so sporadically that he can hardly hope to find them fertile. Furthermore, just such plants are likely to be character plants of the associations. They are often gigantic trees of which flowers are not easily detected from the ground; or lianas, whose leaves, even, are inaccessible in the tops of the trees; or palms, extremely difficult to collect adequately; or bamboos, very seldom found in flower. When confronted with such a situation, the botanist will find that his difficulties vanish as if by magic if he undertake to learn the flora as the natives know it, using their plant names, their criteria for identification (which frequently neglect the fruiting parts entirely), and their terms for habitats and types of land.

The names most often used will in general be those of the species of greatest utility, or of the greatest importance in land classification. The latter are the ones most important for the definition of associations. As

many names as possible should be listed, and the ones coming up most frequently in conversation should be associated as soon as possible with the species to which they apply. There is always a residue of names for rare species with which no plants are associated, and, conversely, many plants are found which are not specifically talked about by natives, and therefore have no specific vernacular names. The result of applying the native-name method in learning the flora, is to concentrate attention on the dominant and most useful species and upon the associations which they characterize, rather than upon the few and possibly non-characteristic species which are merely convenient to collect, or which are accidentally found in readily determinable condition.

By learning native plant names the botanist is able at once to make serviceable notes upon plant associations in which the characteristic species may never be seen except in sterile condition, or not found fertile until long after their occurrence should have been recorded many times. It is of course possible, and very frequently necessary, to use arbitrary designations for plants in tropical field work, or numbers, which are not easily remembered, but a vernacular name if one can be learned is infinitely preferable because it makes botanical inquiry possible. Many interesting plants and facts about them come to light only if one makes a habit of talking about botanical matters with natives. If one is interested in vernacular names he will at first hear them faster than he can find the plants to which they belong. Unchecked names in his list will indicate gaps in his information about important plants which he will be constantly on the look-out to fill. Native companions are generally more interested in hunting specific plants, or habitats, than they are in helping with routine collecting. Insistence upon the necessity of finding dominant plants in flower or fruit will generally result in some sort of determinable material being collected. Nothing would be easier than for a casual collector in Central America to leave the characteristic species of most of the associations uncollected and unnoted—to have nothing to prove the presence of the mahogany, for instance, in the mahogany forest, or the chicle tree in the great *zapote* forest. The writer, in spite of as close adherence as practicable to his scheme of following up unassociated names, had to leave the field at the close of the 1931 season with several of the more important plants quite unaccounted for. The same was even more true at the close of field work in a limited region of Sumatra in 1927; there remained on the list of unidentified plants several of such importance that place names were derived from their dominance at particular localities.

The preceding paragraphs will indicate something of the point of view with which the writer made his first contact with Central American vegetation. After experience in the East Indies, and Mexico, part of which had been mere collecting, the writer felt when he started work in Central America that he had developed a ready and serviceable method of procedure

for ascertaining folk knowledge of plant associations, which would suffice for the rapid reconnaissance that is undertaken in a general biological survey.

It speedily became obvious that in British Honduras and Guatemala the people knew an unusually large number of plants, had names for them, which might be "creole," Spanish or Maya, and, furthermore, that they had a perfectly definite land and vegetation classification, with appropriate nomenclature in English, Spanish and Maya. Such knowledge furnished a perfect basis to build upon, and as a matter of fact the local classification and nomenclature of vegetational types is so serviceable and natural that it needs only to be taken over and scientifically formulated to make available to science information that is already folk knowledge. Thus we shall have an incomparably more adequate knowledge than we shall ever possess if we wait for the application of ideal quantitative methods. Many natives have a knowledge of local natural history far superior to that which a scientific visitor could possibly glean without their assistance in any reasonable length of time. It must be remembered that in the region under consideration, as in many other forested tropical regions, much time is spent in felling forest to make clearings, and that the natives have a lively curiosity about what they find. Furthermore many of them have spent a large part of their lives in scouting for mahogany, tapping the chicle tree, and in the exploitation of other forest products, so that they inevitably acquire a great deal of astonishingly precise knowledge about plants.

It is only forest associations that are more difficult to analyze in the tropics than the simpler associations with which we deal in temperate regions. Grass-lands, etc., present no especial difficulties and are not markedly rich in species. The difficulty concerns the old forest, with its great diversity of species which are inaccessible from the ground, which can not be collected without laborious climbing or chopping, and which are too often found to be sterile when felled for identification.

The technique of assimilating folk knowledge of tropical plant associations into conventional plant geography is in theory simple enough, but in practice it is found to present its share of difficulties. Instead of making a quantitative vegetational analysis by felling strips and quadrats, which is rarely or never practicable for a non-resident botanist with limited time and labor resources, the procedure is to utilize the experience which the natives have gained in seeking wild products and in locating new land for their primitive agricultural utilization of forest clearings (*milpas*). Obviously the best possible training in the method is to be present during the making of clearings, and to study and secure a name for everything that falls, whether sterile or fertile; to accompany natives in their quests for specific forest products; to inquire minutely into their basis for selecting land for different kinds of utilization. The information obtained must be put to the

test in the forest, with natives as critics. Interest in native names is the almost indispensable prerequisite in a non-resident botanist who is to be a reasonably competent phytogeographer as well as a collector.

The method involves the assumption that natives who have occupied an area for generations will have names for the dominant species in the flora, and that persistence in collecting the names and finding out how they are applied will result in accounting for most of the species which should be taken into consideration if plant associations are to be recognized in the phytogeographic reconnaissance of botanically new country.

The utilization of folk science as a method in phytogeographic work is commended to botanists who have found it difficult (as the writer confessedly has) to give proper attention to the vegetation because of too great concern over collectible flowers and fruits. The rules should be (1) to learn each species for which the natives know a name, (2) to be able to use their criteria for recognizing each species, even if sterile, (3) to be everlastingly persistent in inquiring about and finding each named species, and (4) to be equally persistent in securing, eventually, good determinable botanical material of each. The last rule is the hardest to observe, but essential to a successful survey. The writer believes that sterile material is better than none, and is exceedingly grateful to those systematists, among whom Dr. Standley is an outstanding example, who have been willing to attempt the identification of imperfect specimens.

MAJOR TYPES OF VEGETATION IN CENTRAL BRITISH HONDURAS AND THE PETEN

The northern part of British Honduras and the Department of Peten in Guatemala are phytogeographically as well as physiographically a part of the Yucatan Peninsula. Although having a well-defined dry season, they lie south of the region of dry thorn forest in country which, with less disturbance and greater rainfall, supports tall rain forest. As one goes westward, there is a well-marked change in the vegetation which corresponds with the absence of permanent streams, and roughly coincides, at least near El Cayo, with the Guatemalan boundary. This change is chiefly noticed in the dropping out of the cohune palm, except in restricted areas, when the higher underdrained limestone country is entered. The region to the east of the international boundary, below a line of hills located to the westward of the international boundary, is Lundell's "Eastern Coast." The underdrained region without permanent streams is "Northern Peten" of his map.¹

Since in British Honduras the language is prevailing English (or what passes for English, although a stranger may at first imagine that the Creole dialect is Carib or some other equally unknown language) it will be useful

¹ Cyrus Longworth Lundell, *Preliminary sketch of the phytogeography of the Yucatan Peninsula*, Carnegie Inst. Wash., Contrib. Amer. Archaeology, No. 12, Pub. No. 436, 1934, Washington.

to outline first the classification of land and vegetation that is current among the "Creoles" in British Honduras and then the more elaborate but basically similar one of the Spanish-speaking inhabitants.

In the central and northern parts of British Honduras the halophytic plant associations (strand and mangrove swamps) are succeeded inland by three major plant associations which conform to soil conditions. These are locally called:

- (1) Cohune ridge (Subclimax cohune-mahogany forest).
- (2) Broken ridge (Climax mahogany-sapodilla forest and *sequelar*).
- (3) Pine ridge (Climax pine forest).

It must be explained at the outset that "ridge" has nothing to do in local parlance with elevation. However low and flat the land may be, even though water stands upon it, it is nevertheless "ridge."

The lowest land near the coast is underlain by sandy Quaternary alluvium; inland there are somewhat more elevated areas of Tertiary limestone, known as the Rio Dulce limestones and marls; which according to Ower are of Oligocene age, but have been found by C. W. Cooke (unpublished information) to be partly Eocene. The lower Tertiary limestone areas are in part covered with a thin mantle of sand, the distribution of which has been modified by erosion. Cohune ridge and broken ridge occupy residual calcareous soils or alluvial soils of mixed origin. Pine ridge occupies sour sedgy sandy land which (as in the high "Mountain Pine Ridge" of the central third of the colony) overlies granitic rocks, or other formations deficient in lime, or land where superficial sand deposits or Quaternary alluvial deposits are thick enough to minimize the effect of lime underneath (as in more northern and coastal parts of the colony). In a land where the soil is thoroughly leached during much of the year by heavy tropical rainfall and not reached by flood water from the rivers, the presence of limestone beneath the soil does not necessarily greatly influence the vegetation.

Cohune ridge occupies the banks of the rivers and low level lands not far from running streams. The soil is rich loam and the vegetation is locally reputed to be "perhaps the richest in the world" (Dillon,¹ p. 18). The plant association, or soil type which is coextensive with it, takes its name from the great abundance of the cohune palm, *Orbignya cohune* (Mart.) Dahlgren (*Attalea cohune* Mart.), called by the Spanish *corozo*, of which Standley² says (p. 111):

"This is by far the finest and most imposing of all Central American palms, its huge leaves greatly exceeding those of every other species. Notwithstanding their size, they are very graceful, and the *corozo* palm is a tree of great beauty."

The Spanish name of the plant association characterized by this noble palm is *corozal*. An alternative name for "cohune ridge," found on some

¹A. Barrow Dillon, *Geography of British Honduras*, 1923, London. (Published by the Crown Agents for the Colonies.)

²P. C. Standley, *Flora of the Lacaitilla Valley, Honduras*, Field Mus. Nat. Hist., Bot. Ser., vol. X, 1931, Chicago.

of the government maps is "mahogany ridge," since mahogany is the chief economic product of the vegetation type. When the mahogany is culled out, mahogany ridge becomes "cohune ridge." In British Honduras and in the Peten there are areas of rich forest without cohune, appropriately enough known as "mahogany ridge" or "sapodilla ridge," to which the term "cohune ridge" can not, of course, be applied at all.

Pine ridge occupies the areas between the rivers where the soil is sandy, and also certain interior areas at higher elevations where the soil is not alluvial or water-worked but locally derived from underlying granitic or other crystalline rock. On this basis it is possible to make a distinction between (1) lowland pine ridge, and (2) mountain pine ridge, which, as far as studied by the writer, comprises the "Mountain Pine Ridge," called on some maps "The Great Southern Pine Ridge." The lowland pine ridge is so flat that it may be submerged more or less constantly in places, but there is no great opportunity for variation in vegetation caused by relief, except by alternation with wet savanna. In the Mountain Pine Ridge, however, there are (1) deep ravines with a well-marked ravine flora, (2) the pine land proper, and (3) swampy meadow, often with mat vegetation of Cyperaceæ and *Sphagnum*, at the edge of streams. Pine ridge soils are seldom or never utilized for agriculture. The great areas in the lowland extend back from the mangrove belt as tongues between the rivers, sometimes practically touching the rivers. The best-known pine ridges lie between the New River and the Hondo (August Pine Ridge and large areas not named on maps), between the New River and the Belize northwest of Big Falls, between the Belize and Sibun Rivers (Young's Pine Ridge), and along the coast from Belize southward to Deep River. The canal which extends southward from Belize, crosses the Sibun River, connects with Northern Lagoon and Manatee Lagoon, and gives access to savanna country forming the transition from the mangrove association to pine ridge. Along the river banks, mangrove grades, by an interesting intermediate association of *Bactris*, *Oreodoxa*, *Pachira*, *Diffenbachia* and other plants, occupying low muddy alluvial sandy clays, into cohune ridge. Near Gales Point and elsewhere on the Manatee Lagoon, the pine ridge country extends to high-tide level and practically reaches the sea.

A beautiful and typical pine ridge may be seen within a short distance up the Belize River from Belize, at the aviation field prepared for (but not at present used by) Pan-American Airways. (See Plates 1 and 2.)

Pine ridge reminds the botanist from the United States of the South-eastern Coastal Plain. The flora is extremely interesting but not at all more complex than we customarily find in our coastal plain pine barrens. The character tree is *Pinus caribæa*, and the live oak, *Quercus oleoides* C. & S. var. *australis* Trel. which often dominates the association, is closely related to our own live-oak, *Quercus virginiana* Mill. (See Plate 1, fig. 2.)

Broken ridge is the name applied locally to areas between cohune ridge and pine ridge. When the belt of cohune palms and transitional broad-leaved species is narrow between the river and pine ridge, the description given by Morris (see below) is admirable. However, as Lundell states, there are areas in northern British Honduras where the forest between the cohune ridge and the pine ridge may cover a strip as much as ten miles in diameter. In such instances, proceeding from the cohune ridge which is subclimax, we next encounter the climax sapodilla-mahogany (*zapotal-caobal*) forest which except for the absence of the cohune palms is as luxuriant as the forest of the cohune ridge. This climax forest occupies black shallow clays where outcropping limestone is common. Proceeding from the climax sapodilla-mahogany forest toward the pine ridge, a zone of marginal scrubby growth is encountered as the pine land is approached. This latter zone is sometimes designated as the *sequelar*. Broken ridge therefore includes climax and marginal scrub forest when the belt between the river and pine ridge is wide, but only scrubby marginal growth when the belt is narrow.

These three primary areas were described many years ago by Morris.¹ As far as the major types of vegetation are concerned, his descriptions are graphic, although he did not mention many species. He was vague, moreover, in his conception of the geological factors concerned in plant distribution, since he thought that the subsoil of the colony was prevailingly non-calcareous. Thus he said (p. 59):

"Geologically speaking, a cohune ridge has been formed by a river valley, or depression in the quartzzy ground-floor of the country, being, in process of time, filled up by large deposits of fine alluvium and vegetable debris."

As a matter of fact, it is more likely that the thin sandy mantle which covers the flat country, overlying limestone in all the northern parts of the colony, was eroded away in the stream valleys, exposing limestone on which the calciphile vegetation, reaching its subclimax in cohune ridge and climax in mahogany-sapodilla forest, established itself. Subsequently some of the stream banks have been built up higher than the land back of them, by silting, and are possibly maintained in a calcareous or neutral condition by being periodically overflowed by calcareous river water.

Morris (*l.c.*, p. 63) particularly well described the vegetation types encountered in going across country from one stream to another within the calcareous region. He may be quoted at some length in this connection:

"In addition to pine-ridge and cohune-ridge there is sometimes known a district possessing a vegetation of its own, to which the colonists apply the term broken-ridge. This broken-ridge country generally appears to lie on the outside, and generally parallel to and continuous with the cohune-ridge; and, in fact, is an intermediate belt of vegetation coming between it and the

¹ Daniel Morris, *The Colony of British Honduras*, 1883, London

pine-ridge country. The trees in this belt are smaller than in the cohune-ridge; the undergrowth is denser and more scrubby in character; and, generally, the conditions indicate a poorer and less luxuriant phase of plant life, toning down more and more until it merges into the scant sparse vegetation of the pine ridge country. . . The broken ridge is no doubt due to a difference in the character of the soil, which, having a slight depth only of humus and alluvium, is able to support a less luxuriant vegetation than the cohune-ridge but a little more so than the pine-ridge, which is almost devoid of these elements of plant food."

What Morris describes is true only where the broken ridge belt is narrow.

"Starting from a river bed and traversing the country at right angles to its course, there first comes the cohune-country, then the broken-ridge and lastly the pine-ridge. The latter generally acts as a watershed between the several river basins, and the order in which the ridges come may be shown as follows:

Cohune- ridge	River	Cohune- ridge	Broken- ridge	Pine- ridge	Broken- ridge	Cohune- ridge	River
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"The vegetation of the cohune-ridge comprises tall-towering timber trees, the lordly mahogany and luxuriant palms; while the ground below is covered with shade-loving ferns, selaginellas, and aroids. The broken-ridge has fewer, less luxuriant, and somewhat stunted timber-trees, such as the cockspur, abundant in prickles and thorn; the supa, or gru-gru palm (*Acrocomia sclerocarpa*) and small-leaved spiny shrubs of *Randia*, *Capparis*, etc. In the more open spaces, coarse bromeliads, rank grasses, and prickly creepers impede one's movements until at last the open pine-ridge country is reached. Here, as already mentioned, the tall (Scotch-looking) firs, or pines, are the more striking objects, surrounded, when in clumps, by the shrubby pimento palms,¹ with the craboo² and the haha³ trees dotted here and there. Amongst the hard, coarse grass of the pine-ridge, small low-spreading shrubs are found, such as *Pithecolobium ligustrum* and *Cassia diphylla*; a few ground orchids (*Habenaria* and *Stenorrhynchus*) and small, yellow-flowered hypoxids."

From the economic standpoint the calcareous or semicalcareous alluvial lands have been of preeminent importance to British Honduras for the reason that they are the habitat of the mahogany tree. To one who is convinced, as the writer is, of the paramount importance of the distribution of limestone in determining the major ecological subdivisions of the flora, it seems impossible that there should not be two fundamentally distinct climax floras (namely broad-leaved and coniferous) on the higher lands, one for each primary soil type, and that between them (occupying what has been

¹ See the paper following in this volume for a description of the pimento palm as *Acalorraphe pinetorum* Bartlett.

² *Byrsonima pulchra* DC. is, according to Mr. C. V. Morton's determinations, the common "craboo" of British Honduras.

³ *Curatella americana* is a small tree or shrub with broad very rough leaves, known by the Spanish-speaking inhabitants as *chaparro* and by the "Creoles" as *haha*.

well called a tension zone) there should be a transitional flora (*sequelar* of the broken-ridge) of extremely variable composition. It is only fair, however, to point out that not all observers come to this point of view.

Mr. N. S. Stevenson (Deputy Conservator in the Forest Department, British Honduras)¹ has expressed the opinion that—

“the mahogany forests of British Honduras have originated in two ways. (1) The primary or natural way by invasion of the pine-lands by groups of broad-leaved trees, producing patches of forest containing mahogany and sapodilla (*Achras sapota* L.) locally known as ‘broken-ridge.’ Coalescence of these groups follows, to form the more advanced type known as ‘high-ridge,’ with final advancement, where conditions permit, to the climax, cohune-ridge, with *Attalæa cohune* Mart. Spontaneous reproduction of the succession, even from the pine stage, may take place after fire or other forest destruction. (2) The secondary or artificial way, chiefly seen in the hill region, takes place by recolonization of the abandoned clearings made by the scanty and shifting population. The forest phase preceding these clearings has been, in all probability, climax forest of the natural type. Such secondary growth is known as *huamil*. Spontaneous regeneration of trees is most prolific at the broken ridge stage and decreases progressively towards the climax; regeneration in the cohune ridge being almost suppressed by the dense shade of the *Attalea*.”

Stevenson considers the cohune ridge to be climax, whereas in all probability it is subclimax, the climax being the mahogany-sapodilla forest of the “high ridge.”

Stevenson's conception, like that of Morris, disregards completely the view that the calcareous (neutral) or non-calcareous (acid) nature of the soil fundamentally controls plant distribution and the nature of the climax vegetation. His idea that pine ridge is supplanted by broken ridge and finally by cohune ridge could only be true within the zone of silting and supply of calcareous water by stream overflow. Given geological time within which streams could base-level the country and meander far from their present beds, his idea might be correct, since the substratum of the pine ridges would be, by the geological process of silting, modified into something essentially different. As far as succession on the geologically unmodified soil of the typical pine ridge is concerned, however, it is perfectly safe to say that the pine climax would never become a cohune or mahogany-sapodilla ridge.

This point of view, *i.e.*, that there is a rigorous control of the vegetation by the distribution of lime, found an energetic local advocate in L. H. Ower,² Government Geologist of British Honduras, whose conclusions did not agree with those of the Conservator of Forests.

¹Quoted from Abstract in Jour. Ecol. XVII Supplement 4, British Empire Vegetation Abstracts, p. 67. Neil A. Stevenson, *Silvicultural treatment of Mahogany Forests in British Honduras*, Empire Forestry Jour., vol. 6; 219-227, 1927.

²Leslie H. Ower, *The Geology of British Honduras*. Printed by the Clarion, Limited, Belize, British Honduras. (Pamphlet of 24 pages; unpagged, no title page, no date, with cover title as follows: “Map of British Honduras, Compiled in Surveyor General's Department, by G. A. Elliott, C. L. S., from Notes and Surveys of L. H. Ower, Government Geologist. Scale 1/1,000,000. Published by permission of Royal Geographical Society.”)

Ower holds that the extent of Maya settlements (*i.e.* those that were based upon agriculture that left vestiges of any sort) coincided strictly with the extent of calcareous soils. He states that all calcareous soils in the colony (except trifling areas) have at some remote time been in cultivation, and that they are therefore now occupied not by primary but by secondary forest. On the contrary, he concluded that the non-calcareous areas have a primary plant cover which has never been extensively modified by man, since they are not now and never have been cultivated. In the course of his geological survey he found traces of terrace cultivation in practically all of the limestone upland. He concludes that the area of mahogany and sapodilla coincides with the area of old cultivation, and therefore with the limestone area. He says:

[The Maya] "lived almost entirely upon the calcareous area. On the limestone plateau abandoned agricultural terraces are very frequent wherever a few yards of soil were obtainable . . . The whole of the limestone, with the exception of that near the source of the Rio Grande, contains the relics of terrace cultivation. This old cultivation has been of the greatest importance to British Honduras, for where it is absent mahogany is seldom seen¹ . . . The whole of the Colony, with the exception of the pine belts, the slates, porphyries, and some small limestone areas, has probably been under cultivation at some time, so much of the present vegetation is of secondary growth. . . . [Cohunes] seldom extend more than a mile back from the streams but will be found in the limestone depressions and on rich soil. . . . Reports by agricultural and forestry experts have been published, but the geological factors influencing these resources have hitherto been unrecognized. The geological map to a large extent serves as a vegetation or soil map of British Honduras. . . Mahogany is nearly always found on the land that was once cultivated, so is seldom seen in the slate country."

Except for the dubious implication that former human occupation of the calcareous areas extended the range or abundance of mahogany (which may be quite true in spite of lack of evidence) the conclusions of Ower coincide closely with those of the writer.

It would seem almost beyond question that there are two chief upland climax vegetations, one calciphile and one calcifuge. They have few species in common. The influence of the lime is, of course, in part secondary, through preventing soil acidity, and the plants which appear to avoid lime, in some measure, but no means entirely, are those that are tolerant of acid soils and are not successful competitors in the vigorous flora of limy soils. It is thus possible to account for the *sequelar* flora of the broken ridge.

LOCAL DESIGNATIONS OF PLANT ASSOCIATIONS: THE SPANISH TERMINOLOGY.

In the Petén upland forest the plant associations are not very different from those of the adjoining but lower calcareous districts of British Honduras. There is indeed some change, as would be expected, corresponding

¹Ower here implies but does not definitely say that he believes mahogany to prevail in the calcareous region because of former human occupation of the land. He writes: "The Conservator of Forest is not in agreement with the statement . . ."

to the transition from the adequately watered coastal districts to the underdrained limestone region of the Peten, and the change is not altogether or even primarily caused by water supply, since a large part of the flora of acid soils found in the pine ridges of British Honduras, and straying at least into the edge of the plant habitats underlain by limestone, drops out as the Peten is entered. Nevertheless some of the pine ridge plants also grow in the drier parts of wooded swamps (*bajos*) in the calcareous Peten upland, and thus are important components of two physiographically very dissimilar habitats. As an example the live oak, *Quercus oleoides* var. *australis*, may be instanced. It is characteristic of oak "islands" in the pine ridges, where it is a dominant plant. Apparently the same oak varies in abundance from a minor to a common constituent of the vegetation in the drier parts of the logwood swamps. Its associates are for the most part an entirely different group of species from those found in the pine ridges. The *bajos* (wooded swamps) do not exclude plants usually found in sour soils, even though they occupy depressions in a limestone country. They are doubtless acid habitats. On the adjacent limestone of the "high bush," however, I did not see a single oak.

I have chosen to list the plant associations (corresponding to habitats) of the whole region of central British Honduras and the adjoining Peten forest and to indicate particularly those associations which are encountered only in a particular part. Incidentally as helping in an approach to completeness, I have listed some associations which the natives refer to, but which I have not seen.

If we omit the halophytic plant communities, the others are as follows:

(1) *Zapotal* (Peten high bush). The writer is in agreement with Lundell's conclusion that *Achras sapota* is a more general constituent of the "high bush" of the calcareous lands of northern British Honduras and the Peten than any other one of the major forest trees, and that therefore the term *zapotal* is the best of several eligible terms by which to designate inclusively the several plant associations that differ from one another in presenting with different local dominants much the same assemblage of species. The writer had used "*ramonal*" as the inclusive term for the "high bush" associations, but Lundell's observations have been more extensive than the writer's on this point. Not only has he studied the distribution of *zapote* in the "Eastern Coast" area of British Honduras but he has also traversed the entire western and central parts of the Peten "high bush." The writer's observations of the *zapotal* have been made in the vicinity of El Cayo and in the stretch of country from El Cayo northwestward to Uaxactun, Peten, that is, all in the eastern part of the Peten forest.

The general prevalence of *zapote chico* (*Achras sapota*) throughout so great an area, and the apparent fact that the vast majority of the trees seem to belong to a very old age class suggest that the factor of human occupation of the land was all important in determining this major plant association. It is possible that the usefulness of the very sweet fruit as food in a sugarless diet may have led the Maya to spare the *zapote* when other trees were destroyed in the clearing of land for planting annual crops.

It is almost certain that during the period of densest population, numerous islands of trees would have been left for shade at house and village sites, and that as wood was needed for various purposes there would have been an elimination of species that bore no useful fruit or other product. We can imagine the Maya of old sparing useful wild trees just as they do today, and just as primitive man does in other parts of the world.

The writer has observed the extreme reluctance of the lowland Batak of the East Coast of Sumatra to destroy certain useful plants of the jungle, and believes that the extent to which the forest is "improved" by these people through setting out seedlings has never been properly appreciated. Very often one may find near a native clearing an appropriate site in the edge of the forest occupied by a seed bed of the more useful species of wild rotan, which are dug when big enough to transplant, done up into bundles and planted in favorable sites throughout the forest, in replacement of mature plants removed for sale. The chiefs require that this be done, and one of the frequent complaints of the natives when they are moved out of lands granted to foreigners as plantation concessions is that their claim to private ownership of apparently wild plants is made light of. The highland Batak both spare and propagate useful woody plants about their villages, so that the landscape resembles a sea of rice fields with numerous wooded islands in which the villages are concealed. If their land were abandoned, the presence of these wooded islands would certainly influence the flora for centuries, both through the actual persistence of individual trees and through the fact that certain selected species would have the advantage of propinquity in seeding the rice terraces and would thus reestablish new forest of a particular type. This would be especially true if the cultivated and semicultivated species were themselves natives of the land. The dry-land *milpa* of the Maya would never have required the clean clearing of the wet rice terrace, but would have resembled more the Malay *ladang* or Batak *djoema* of Sumatran primitive agriculture, in which we may be sure that a useful fruit tree would have been left. The sugar-palm groves of lowland Sumatra, which are one well-marked plant association of second-growth forest are often if not always of artificial origin. To argue about what the Maya may have done from what a tropical race on the other side of the world actually do may not seem very convincing, but the line of thought is one which should be productive in the endeavor to determine the ecological succession from cleared field to forest and the effect of ancient human occupation upon the present flora of the Maya area.

The *zapotal* is a highly variable plant association which grows on the high well-drained calcareous areas. It is characterized from Uaxactun eastward to the Guatemalan boundary by an abundance of at least part of the following species:

A. Exogenous trees, arranged alphabetically, starred if sometimes among the six or eight dominant trees of the association:

- | | |
|--|--|
| <i>Acacia collinsii</i> Safford | * <i>Casalpinia violacea</i> (Miller) Standl. |
| <i>Annona</i> (Bartlett 12474) | <i>Casalpinia yucatanensis</i> Greenm. |
| * <i>Aspidosperma megalocarpon</i> Muell. Arg. | * <i>Cedrela mexicana</i> Roem. |
| <i>Aspidosperma sanguineum</i> Bartlett | * <i>Ceiba pentandra</i> (L.) Gaertn. |
| <i>Astrocasia phyllanthoides</i> Robins. & Millsp. | * <i>Celtis hottlei</i> Standl. |
| * <i>Buerreria oxyphylla</i> Standl. | <i>Clusia</i> (2 species) (See Plates 3 and 4) |
| * <i>Brosimum alicastrum</i> Sw. | * <i>Cupania belizensis</i> Standl. |
| * <i>Bumelia mayana</i> Standl. | * <i>Dipholis salicifolia</i> A. DC. |
| * <i>Bursera simaruba</i> (L.) Sarg. | <i>Drypetes brownii</i> Standl. |

- Drypetes lateriflora* (Sw.) Krug. & Urban
Eoiothea paniculata (Guss.) Radlk.
 **Forchammeria trifoliata* Radlk.
 **Guarea excelsa* H. B. K.
 **Hirtella americana* L.
Krugiodendron ferreum (Vahl) Urban
 **Lætia thamnina* Sw.
Lonchocarpus castilloi Standl.
 **Lucuma campechiana* H. B. K.
 **Lucuma durlandii* Standl.
Malmea depressa (Baill.) Fr.
Nectandra sp.
 **Pimenta officinalis* Lindl.
 **Protium copal* (S. & C.) Engl.
 **Pseudolmedia spuria* (Sw.) Griseb.
- Quararibea fieldii* Millsp.?
Sapindus saponaria L.
Sickingia salvadorensis (Standl.) Standl.
 **Sideroxylon amygdalinum* Standl.
 **Sideroxylon meyeri* Standl.
 **Simaruba glauca* DC.
 **Stemmadenia donnell-smithii* (Rose) Woodson
 **Swietenia macrophylla* King (See Plates 3 and 4)
 **Tabebuia pentaphylla* (L.) Hemsl.
 **Talisia floresii* Standl.
 **Trichilia minutiflora* Standl.
 **Vitex gaumeri* Greenm.
Wimmeria concolor S. & C.
- B. Exogenous shrubs or treelets:
Piper cobanense Trel.
Piper villipetiolatum Trel.
Piper yalochanum Trel.
- C. Endogenous woody trees or shrubs:
Sabal morrisiana Bartlett (See Plates 3 and 6)
Cryosophila argentea Bartlett¹
- Psychotria limonensis* Krause
Ruellia stemonacanthoides (Erst.) Hemsl
- Opsianra maya* Cook (See Plates 10 and 11)
Chamædorea (several species)
Dracæna americana Donn. Sm.
- D. Lianas:
- Araceæ

Anthurium æmulum Schott
Monstera guatemalensis Bartlett
Philodendron sp.
Philodendron smithii Engl.
 - Woody monocotyledones

Desmoncus ferax Bartlett
Desmoncus uaxactunensis Bartlett
 - Dicotyledones

Dioscorea bartlettii Morton (See Plate 14)
Smilax medica S. & C.
- Adenocalymna fissum* Loes.
Dalbergia glabra (Mill.) Standl.
Petrea arborea H. B. K.
Vitis tiliæfolia H. B. K.

Phases of the *zapotal* to which separate names are locally applied are characterized by fluctuations in abundance of the dominant species. The chief ones are:

(1a) *Ramonal*. The dominant species is the *ramon*, *Brosimum alicastrum* Sw. This species is one of the economically very important trees of the region, since it is cut for fodder, and is essential in the "high bush" for feeding mules, which provide the only transportation of the region. Lundell² has noticed a high correlation between the abundance of *ramon* and the presence of Maya ruins. It is very probable that the *ramon* was left standing or may even have been planted by the Maya, as a resource in the event

¹ See following paper in this volume, and also Plate 7.

² He writes: "I have found groves of the *ramon* tree covering every Southern Culture ruin which I have visited, and it is no mere coincidence that this species is so abundant there. Of the other trees, cacao and *mamey* were doubtless of the greatest importance as additional tree crops, for they also bear fruit in the dry season. It is probable that these trees and many others which are now found in the region also grew in some of the plazas and streets, providing both shade and food." C. L. Lundell, *The Agriculture of the Maya*, Southwest Review, vol. 19, 65-77, 1933. (See pp. 71-72.)

of crop failures. Its fruit may be used as a human food, as indicated by the Creole name, bread-nut. If this supposition regarding *ramon* should be supported by future investigations it will afford additional support for the supposition that the plant associations of the Peten forest were determined largely by human agency centuries ago. The *ramon* is presumed to have been given its original dominance by preservation when less useful trees were destroyed or to have been actually planted, and never to have been forced into a secondary rôle as the forest reclaimed land deserted by human occupants.

(1b) *Caobal*. The important, even if not dominant, species is mahogany (*caoba*), *Swietenia macrophylla* King. (Plates 3, 4.) It may be assumed to have spread quickly to abandoned lands because of its winged seeds.

(1c) *Uacutal*. This phase is very rare and characterized by the gigantic tree called *uacut*, *Bernoullia flammea* Oliver. (See Plates 4 and 5.) I have seen it only amid the ruins of Tikal, where the flora was not fully collected in the brief time at my disposal, but contained the following species:

Bernoullia flammea Oliver
Achras sapota L.
Brosimum alicastrum Sw.
Bumelia mayana Standley
Jacquinia aurantiaca Ait.
Miconia impetiolaris (Sw.) Don
Ouratea pyramidalis Riley
Sabal morrisiana Bartlett

Cryosophila argentea Bartlett
Chamædorea (several species)
Bactris sp.
Dracæna americana Donn. Sm.
Piper tikalense Trel.
Psychotria flava Griseb.
Dryopteris melanosticta (Kuntze) Kuntze

(1d) *Cedral*. Characterized by the dominance of *Cedrela mexicana* Roem.

(1e) *Manaxal*. So called if "cherry," *Pseudolmedia*, (*manax*), is abundant.

(1f) *Higueral de las ruinas*. The undisturbed vegetation of the ruins is similar to that of the *ramonal* or the *caobal*, but has two characteristics of its own, namely, the abundance of strangling figs, which, enveloping the stones of the masonry and eventually falling, are responsible for much of the destruction of the old buildings, and the presence of certain plants that may possibly represent vestiges of an ancient ruderal and semicultivated plant association. On the uncleared ruins of Uaxactun one finds a random assortment of the "high bush" (*caobal*) flora with at least the following species more in evidence than usual, and some of them with the aspect of being weeds or of weedy propensity:

Ficus lapathifolium (Liebm.) Miq.
Bumelia mayana Standl.
Amyris sylvatica Jacq.
Bauhinia divaricata L.
Hybanthus yucatanensis Millsp.
Bernardia interrupta (Schlecht.) Muell.-Arg.
Piper cobanense Trel.
Carica papaya L.
Solanum lanceifolium Jacq.
Solanum nudum L.
Borreria levis (Lam.) Griseb.
Psychotria pubescens Sw.
Capsicum macrophyllum (H. B. K.) Standl.
Hibiscus sp.
Russelia campechiana Standl.
Otopappus scaber Blake
Schistocarpus oppositifolia (Kuntze) Rydb.
Amaranthus dubius Mart.

Celosia nitida Vahl
Iresine celosia L.
Dioscorea bernoulliana Prain & Burkill
Passiflora biflora Lam.
Smilax mollis Willd.
Tournefortia hirsutissima L.
Anthurium tetragonum Hook. var. *yucatanense* Engl.
Agave sp.
Euphorbia graminea Jacq.
Neurolena lobata (L.) R. Br.
Rhoeo discolor (L'Her.) Hance
Adiantum tricholepis Fee
Asplenium dentatum L.
Dryopteris patens (Sw.) Kuntze
Pteris biaurita L.
Pteris grandifolia L.
Pteris quadriaurita Retz

(1g) *Guarumal*. If the "high bush" is cleared and allowed to revert to forest, a very conspicuous phase in the succession is that in which *Cecropia* (*guarumo*) springs up as a dense growth. At Uaxactun it is accompanied by a wild papaya (*Carica papaya* L.) with very small practically worthless fruit. The *guarumo* is a very rapid grower and with the papaya makes a dense thicket in which the soft young trees can be as easily chopped with a machete as stems of herbaceous plants. The hollow stems of *guarumo* are inhabited by ants that bite viciously. The flora is exceedingly weedy and is probably seeded in large part from the more scattered and less conspicuous weedy plants of the ruins. At Uaxactun were listed:

Cecropia obtusa Trécul
Carica papaya L.
Celtis trinervia Lam.
Guazuma ulmifolia Lam.
Trema floridana Britton
Hamelia patens Jacq.
Psychotria pubescens Sw.
Bauhinia divaricata L.
Hybanthus yucatanensis Millsp.
Piper auritum H. B. K. var. *amplifolium*
 C. DC.
Piper cobanense Trel.
Piper villipetiolatum Trel.
Cissampelos tomentosa DC.
Dioscorea bernoulliana Prain & Burkhill
Passiflora adenopoda DC.
Passiflora biflora Lam.
Calonyction aculeatum (L.) House
Ipomea polyanthes R. & S.
Amaranthus dubius Mart.
Iresine celosia L.

Celosia nitida Vahl
Desmodium frutescens (Jacq.) Schindl.
Borreria laevis (Lam.) Griseb.
Rivina humilis L.
Acalypha (Bartlett 12464)
Sida glutinosa Commers.
Hibiscus clypeatus L.
Capraria biflora L.
Russelia campechiana Standl.
Capsicum macrophyllum (H. B. K.) Standl.
Capsicum viscidum Standl.
Cestrum panamense Standl.
Solanum nudum L.
Tournefortia hirsutissima L.
Cirsium mexicanum DC.
Schistocarpa oppositifolia (Kuntz) Rydb.
Neurolaena lobata (L.) R. Br.
Leptochloa virgata (L.) Beauv.
Dryopteris patens (Sw.) Kuntze
Pityrogramma calomelæna (L.) Link

(1g) *Botanal: guanál*. In the borders of the "high bush" along the *bajos* the flora is characterized by a predominance of palms, the species being also found on the higher ground with the plant associations already enumerated. I have called the transition flora *botanal* if *Sabal morrisiana* dominates and if the soil is moist enough so that there are filmy ferns on the bases of the *botan* trunks. (See Plate 6.) The *botanal* passes into the *escobal*, a true *bajo* association, in which *Cryosophila* dominates, often accompanied by *Desmoncus*.

(2) *Corozal*. This is also one of the vegetational units classified in British Honduras as "high bush" or "cohune ridge." It extends through Peten, but is not found near Uaxactun. It occupies alluvial stretches, overlying limestone, and takes its names from the dominance of the *corozo*, or cohune, palm. It is found along the rivers and in some favorable areas far from running water. Here are found dominantly:

corozo (*Orbignya cohune* (Mart.) Dahlgren.) *jobo* (*Spondias purpurea* L.)
caoba (*Swietenia macrophylla* King) *zapotillo* (*Lucuma durlandii* Standl.)
cordoncillo (*Piper*, various shrubby species) *cherry*: (*Pseudolmedia spuria* (Sw.) Griseb.)
zapote macho (*Achras chicle* Pittier)

(2a) *Guamil: matorral*. If an area in "high bush" (*ramonal* or *corozal*) is cleared and used for pasture, or otherwise kept open until it becomes grassy, it is quickly occupied, when abandoned, by coarse weeds, shrubby plants and quick-growing second-growth trees. The association is very diverse. A phase which can hardly escape particular notice is:

(2b) *Zarzahuecal*. A brambly growth of weeds and shrubs tied together impenetrably (unless one chops laboriously at the risk of being badly torn by thorns) with *zarzahueca*, *Byttneria aculeata* Jacq. This particular phase of *guamil* is succeeded by one characterized by the growth of such trees as *pixoy*, *Guazuma ulmifolia* Lam. and *Trema floridana* Britton.

(3) *Pedregal*. This is the plant association found on a steep rocky slope or declivity, or an outcrop of limestone, often strewn with chert and limestone fragments or large rocks. Since it is part of the "high bush" it might be classified as a subdivision of the *zapotal* or *ramonal*. However, its herbaceous flora is richer in species than that of the darker forest where the soil is deeper and the ferns, especially, are more numerous. (See Plate 13.) Since it is characterized by the low vegetation and may have any of the large trees of the well-drained limestone, only two of the smaller prevailing trees and some of the smaller plants are here listed for this association as it occurs at Uxaactun:

Oreopanax capitatum (Jacq.) D. & P.
Trichilia minutiflora Standl.
Piper cobanense Trel.
Acalypha villosa Jacq.
Bauhinia divaricata L.
Passiflora (Bartlett 12832)
Pedilanthus tithymaloides Poit.
Solanum nigrum L.
Laportea mexicana Liebm.
Urera baccifera (L.) Gaud.
Chamædorea (2 or more species)
Lasiacis grisebachii (Nash) Hitchc.

Anthurium tetragonum Hook. var. *yucatanense* Engl.
Dorstenia contrajerva L.
Peperomia martini Trel.
Peperomia quicheensis Trel.
Spiranthes costaricensis Reichenb. F.
Adiantum tenerum Sw.
Adiantum villosum L.
Asplenium dentatum L.
Asplenium pumilum Sw.
Pteridium caudatum (L.) Maxon
Tectaria heracleifolia (Willd.) Underw.

(4) *Sequelar*. This habitat name is not derived from a plant name, apparently, and seems to be a local derivative of the Spanish *sequedal* or *sequeral*, a place with dry unwatered soil. In its local form, the word is botanically more useful than it would be in its approved dictionary spelling, since it may be restricted in meaning in accordance with local usage. A *sequelar* is typically the transitional plant association which in British Honduras lies between the climax mahogany-sapodilla ridge and the pine ridge. In it there is a mixture of certain adaptable species from the *corozal*, *zapotal* or mahogany-sapodilla-ridge with others from the *pinar*, and a very great change in the dominant types. Species which are inconspicuous elements in one of the other formations become important in the *sequelar*. At Duck Run east of El Cayo, British Honduras, the *sequelar* contains:

jobo (*Spondias purpurea* L.)
botan (*Sabal morrisiana* Bartlett)
caoba (*Swietenia macrophylla* King)
palo mulato, chacah (*Bursera simaruba* L.)
zapotillo (*Lucuma durlandii* Standl.)
subin (*Acacia cookii* Safford)

milady (*Aspidosperma megalocarpon* Muell. Arg.)
milady colorado (*Aspidosperma sanguinale* Bartlett)
grandy betty (*Cupania belizensis* Standl.)

(4a) *Subal*. In the event of the *suba* palm, *Acrocomia mexicana* Karw., being predominant, the *sequelar* merges more closely into the *pinal* and is known as *subal*.

(5) *Pinar: pinal*. This is the "pine ridge" of British Honduras. It has already been discussed at considerable length. It is characterized by the *pino* (*Pinus caribæa* Morelet) by *pimenta* palm clumps, and by an herbaceous vegetation predominantly of sedges. (See Plates 1 to 2.) On the basis of variation in the tree flora there may be distinguished at least one well-marked phase, which is nearly always present, namely:

(5a) *Encinal*. Oak "islands" or groves in the pine ridge. If the oaks (mostly *Quercus oleoides* var. *australis* Trel.) are dispersed uniformly among the pines, this phase can not be distinguished, but the oak islands are generally well defined and are sometimes groves of considerable size, containing large trees. (See Plate 1.)

From the standpoint of the shrubby and herbaceous vegetation, which is greatly influenced by the nature of the shade and by minor variations in level, it would be possible to distinguish a considerable number of sub-associations of the pine ridge, some of which would have exact or very nearly exact counterparts in the *sabana*. One which is perhaps named for practical reasons (just as we distinguish a huckleberry swamp from other unclassified but very similar swamps because it has huckleberries in abundance, or as we designate a poison sumac swamp as such, ignoring the species which do not immediately concern us) is:

(5b) *Nanzal*. An area in which *Byrsonima pulchra* DC. (*nanze*) is predominant. This subassociation is not coordinate in importance with the *encinal*, since the *nanze* is but one of several shrubs of similar habit of growth which fluctuate in abundance. It is always associated, for instance, with *Curatella americana* L. (*haha*; *chaparro*) which is often dominant. (See Plate 2.) This association does not intrude upon the *encinal*, but may be a part of either the *pinar* or the *sabana*. If the pines of the *pinar* are destroyed and reproduction is prevented by fires, the *pinar* becomes:

(6) *Sabana*. This is a more or less open plain with herbaceous vegetation, isolated trees of *Crescentia* (see Plate 2), and scattered shrubs, with or without clumps of palmetto and oak. The *sabana* which is seen along the coast of British Honduras may be entirely natural, the growth of pine being perhaps prevented by the presence of too much salt in the soil. There may be other natural *sabanas*.

(7) *Cipresal: barrancal*. Within the Mountain Pine Ridge of British Honduras are ravines containing a very different vegetation from that of the flat pine land. The characteristic plants of the ravines will probably be found to belong to the flora of the non-calcareous mountain area to the southward, which is as yet inadequately known. Here the relatively rich flora includes *Podocarpus pinetorum* Bartlett¹ (*cipres*), *Ormosia*, *Ilex*, *Oreopanax*, *Clusia*, the mountain cabbage palm, two tree ferns, and many other interesting plants. The very edge of the ravine, especially if it slopes off somewhat gently, has a very different association from that of the pine ridge proper (*pinar*) or the *cipresal*. It is a dense bracken thicket called:

(7a) *Cizal: helechal*. The predominant plant, nearly a pure growth, is *ucizilchican*, *Dicranopteris pectinata* (Willd) Underw.

(8) *Escobal*. This is the type of wooded swamp which lies most nearly at the "high bush" level and is therefore really transitional from the "high bush" associations to the *bajos*, or swamps. It surrounds the small permanent or subpermanent water holes (the *aguadas*) of the upland and may

¹ *Podocarpus pinetorum* sp. nov. a *P. oleifera* differt foliis supra hand sulcatis, a *P. guatemalense* statura arborea, diametro 25 cm., et foliis duplo brevioribus, rectis nec falcatis—Specimen typicum legit H. H. Bartlett n. 13109, "Mountain Pine Ridge, El Cayo District, British Honduras, 8 May, 1931." I have somewhat reluctantly separated this from *P. guatemalensis* Standley, since the type of the latter (Standley 25090, "wet thicket" at Puerto Barrios, Dept. Izabal, Guatemala) was a shrub 6 feet tall with falcate leaves twice as long as those of *P. pinetorum* (i.e. up to 15 cm. long, and 9-11.5 mm. wide). There is a possibility that Standley's specimen represents a juvenile state of the same species, but to reach any certainty about the matter it will be necessary to study *P. guatemalensis* at the type locality.

constitute much of the higher part of the *bajo* itself, the term *bajo* being used in its broad sense as including all the wooded muddy swamps. (See Plates 7 and 8.) In the *escobal* are found:

- | | |
|--|---|
| <i>escoba</i> (<i>Cryosophila argentea</i> Bartlett) | <i>Dioscorea bartlettii</i> Morton |
| <i>caoba</i> (<i>Swietenia macrophylla</i> King) | <i>Hiraea obovata</i> (Kunth) Niedenzu |
| <i>botan</i> (<i>Sabal morrisiana</i> Bartlett) | <i>Paullinia fuscescens</i> H. B. K. |
| <i>jobo</i> (<i>Spondias purpurea</i> L.) | <i>Serjania scatens</i> Radlk. |
| <i>zapote chico</i> (<i>Achras sapota</i> L.) | <i>Passiflora</i> (Bartlett 12840) |
| <i>milady blanco</i> (<i>Aspidosperma megalocarpon</i> Muell. Arg.) | <i>Petrea arborea</i> H. B. K. |
| <i>milady colorado</i> (<i>Aspidosperma sanguinale</i> Bartlett) | <i>Strychnos panamensis</i> Seem.? |
| <i>grandy betty</i> (<i>Cupania belizensis</i> Standl.) | <i>Arctotonia sempervirens</i> Trel. |
| <i>water wood</i> (<i>Cestrum panamense</i> Standl.) | <i>Piper cobanense</i> Trel. |
| <i>mora</i> (<i>Chlorophora tinctoria</i> (L.) Gaud.) | <i>Piper psilorrhache</i> C. DC. |
| <i>Trichilia moschata</i> Sw. | <i>Ardisia escallonioides</i> S. & C. |
| <i>Ouratea jurgensii</i> (Planch.) Engl. | <i>Coccoloba reflexiflora</i> Standl. |
| <i>Acacia collinsii</i> Safford | <i>Borreria ocimoides</i> (Burm.) DC. |
| <i>Lonchocarpus guatemalensis</i> Benth. | <i>Morinda yucatanensis</i> Greenm. |
| <i>Lonchocarpus</i> (Bartlett 12573) | <i>Psychotria fruticetorum</i> Standl. |
| <i>Lonchocarpus hondurensis</i> Benth. | <i>Psychotria undata</i> Jacq. |
| <i>Bucida buceras</i> L. | <i>Agave</i> (Bartlett 12850) |
| <i>Nectandra glabrescens</i> Benth. | <i>Blechnum pyramidatum</i> (Lam.) Urb. |
| <i>Bauhinia</i> sp. | <i>Vernonia aschenborniana</i> Schauer |
| <i>Desmoncus uaxactunensis</i> Bartlett. (See pl. 9) | <i>Zexmenia serrata</i> Llave |
| | <i>Eupatorium macrophyllum</i> L. |
| | <i>Panicum trichanthum</i> Nees |

The *escobal* varies greatly in composition and at higher levels may contain more *botan* than *escoba*. If it does, it becomes:

(8a) *Botanal; guanál*. A place where *Sabal morrisiana* (thatch palm; *botan*) predominates. In general it is an association that occupies somewhat higher ground than the most typically developed *escobal*. (See Plate 6.) At Uaxactun it contains:

- | | |
|--|---|
| <i>botan</i> (<i>Sabal morrisiana</i> Bartlett) | <i>Bauhinia jenningsii</i> Wilson |
| <i>ramon</i> (<i>Brosimum alicastrum</i> Sw.) | <i>Arctotonia sempervirens</i> Trel. |
| <i>copal</i> (<i>Protium copal</i> (S. & C.) Engl.) | <i>Piper cobanense</i> Trel. |
| <i>Trichilia minutiflora</i> Standl. | <i>Piper psilorrhache</i> C. DC. |
| <i>Guarea excelsa</i> H. B. K. | <i>Ruellia stemonacanthoides</i> (Erst.) Hemsl. |
| <i>Celtis hottlei</i> Standl. | <i>Hiraea obovata</i> (Kunth) Niedenzu |
| <i>Pimenta officinalis</i> Lindl. | <i>Passiflora</i> (Bartlett 12158) |
| <i>Lucuma durlandii</i> Standl. | <i>Vitis tiliacifolia</i> H. B. K. |
| <i>Miconia impatiolalis</i> (Sw.) Don | <i>Dioscorea bartlettii</i> Morton |
| <i>Guatteria leiophylla</i> (Donn. Sm.) Saff. | <i>Smilax medica</i> S. & C. |
| <i>Sebastiania longicuspis</i> Standl. | <i>Smilax mollis</i> Willd. |
| <i>Citharexylum pinninervium</i> Standl. | <i>Geophila herbacea</i> (Jacq.) Schum. |
| <i>Psychotria alba</i> R. & P. | <i>Ichnanthus pallens</i> (Sw.) Munro |
| <i>Psychotria granadensis</i> Benth. | |

(8b) *Cascarillal (bajo blanco, bajo de cascarillo)*. I know this association only from native reports, not having seen it. It is said to be developed extensively between Canoa and Carmelita and to be characterized by the abundance of a plant called *cascarillo*, locally supposed to be equivalent in its medicinal properties to quinine and said to be made into a medicine for fevers called "elixar de La Vega." The decoction is said to be useful for washing sores. With it are said to grow:

- guayabillo* (*Hasseltia mexicana* (Gray) Standl.)
botan (*Sabal morrisiana* Bartlett)
carrizo (unidentified)

(9) *Tintal*. This major association is the most generally prevalent type of wooded swamp (*bajo*). The swamp is covered with water during the wet season but dries somewhat during the dry season. Here are:

- tinta* (*Hæmatoxylum campechianum* L.)
guayabillo (*Hasseltia mexicana* (Gray) Standl.)
zapote chico (*Achras sapota* L.)
 black poison-wood (*Metopium brownei* (Jacq.) Urb.)
encino (*Quercus oleoides* H. B. K. var. *australis* Trel.)
Clusia sp.
Pithecolobium lanceolatum (H. & B.) Benth.
Mimosa hemiendyta Rose & Robins.
Ardisia escallonioides S. & C.
Eugenia lundellii Standl.
Cryosophila argentea Bartlett
Bernardia interrupta (Schl. Muell.-Arg.)
Croton niveus Jacq.?
Croton reflexifolius H. B. K.
Capparis cynophallophora L.
Gymnopodium antigonoides (Robins.) Blake
Ternstroemia sphærocarpa (Rose) Melch.
- Miconia ambigua* (Bonpl.) DC.
Morinda (*Bartlett 12808*)
Psychotria flava (Erst.)
Hircea borealis Niedenzu
Passiflora palmeri Rose var. *sublaceolata* Killip
Serjania scatens Radlk.
Serjania adiantoides Radlk.
Wedelia adherens Blake
Wedelia parviceps Blake
Agave sp.
Pedilanthus sp.
Borreria verticillata (L.) Meyer
Egletes viscosa (L.) Less.
Eupatorium odoratum L.
Perymenium peckii Robins.
Canna sp.
Heliconia sp.
Scleria melaleuca S. & C.

This association represents a late phase in the silting up and transformation into dry land of shallow lagoons (*lagunas*) which were their geological predecessors. (See Cooke.¹) With difficulty one may generally get a mule through the *tintal* even in the wet season.

(10) *Tembladeral*. This is the wettest part of the *bajo*, and is avoided at all seasons since mules are likely to be mired in it and lost. Its characteristic plants vary from place to place. Two definitely different associations which are generally recognized (but were not studied by the writer) are numbered 10a and 10b.

(10a) *Julubal*. Here grows a plant called *julub* (*hulub*), together with vines and sedges.

(10b) *Zapotebobal*. Here the tree called in British Honduras "provision tree" and in Peten *zapotebobo* is said to be dominant. Although characteristic of quagmires near the coast above the mangrove belt, *zapote bobo* (*Pachira aquatica* Aubl.) is said to grow in the wettest *bajos* within six miles of Uxactun. The plant is very easily recognized, and there is little reason to doubt the reports of chicleros. At any rate they talk of *zapotebobales*, and of *zapotebobo* which grows in them almost to the exclusion of everything else except vines (*bejucos*).

(11) *Laguna: charco*. At various places in British Honduras and Peten there are long narrow shallow lakes in various stages of extinction through silting and invasion by vegetation. They represent an early stage in the development of *bajos* whose different plant associations have been defined. The flora of the *lagunas* has not been investigated, but names were obtained at Yal'och for two associations as follows:

(11a) *Naabal*. The waterlily association, characterized by *utop naab*, *Nymphæa ampla* (Salisb.) DC.

(11b) *Carrizal*. The reed association in the edge of the water. (Species not identified.)

(12) *Aguada*. The water holes which are not parts of big *bajos* and lie at a high enough level to be surrounded by some association other than the *tintal* (either the *escobal* or *botanal*) constitute a distinct habitat. It would be worth while to investigate as many of them as possible since they vary greatly in floristic composition. The number of species found in each

¹ C. W. Cooke, *Why the Mayan cities of the Peten District, Guatemala, were abandoned*, Jour. Wash. Acad. Sci., vol. 21, 1931.

is not great, and each one seems to have some two or three species which may be missing at the next. Two types are as follows:

(12a) *Lechugal*. *Pistia stratiotes* L. (*lechuga*) floats in a dense mat on the surface of the water, with *Lemna* and *Wolffia*. (See Plate 12.) Shrubs and trees which grow in the water of an *aguada* of this type at Uaxactun are:

Æschynomene deamii Robins. & Bartl.
Alternanthera obovata (M. & G.) Millsp.

Lonchocarpus guatemalensis Benth.
Psychotria ærstediana Standl.

(12b) *Pital*. The edge of the water is filled with a dense mass of saw-toothed *pita*, *Ananas magdalenæ*. The *aguada* at Tikal is of this type. Here there are no free-floating species, but the following plants actually grow in the water:

Ananas magdalenæ (Andre) Standl.
Ardisia compressa H. B. K.
Trichilia havanensis Jacq.

Cassia grandis L. f.
Lonchocarpus guatemalensis Benth.
Inga spuria H. & B.

(12c) *Aguacatillal*. Perhaps not practicably distinguished from the *escobal*, but, appearing at the edge of *aguadas*, is an association in which the Lauraceæ called *aguacatillo* are conspicuous. There are probably no species in this subassociation which are not also found along water courses and in the *escobal* at the edge of the *bajos*, but the vegetation has a different physiognomy. The species for a definite locality, Uaxactun, are as follows:

Nectandra glabrescens Benth. (?)
Bucida buceras L.
Sebastiania longicuspis Standl.
Lonchocarpus guatemalensis Benth.
Trichilia moschata Sw.
Calyptanthus chytaculia (L.) Sw.
Piper psilorrhache C. DC.
Psychotria ærstediana Standl.
Thevetia sp.
Xylosma flexuosa (H. B. K.) Hemsl.

Chamædorea (Bartlett 12446)
Dioscorea matagalpensis Uline?
Renealmia occidentalis (Sw.) Sweet (See Plate 12.)
Typha angustifolia L.
Cyperus (3 species)
Alternanthera obovata (M. & G.) Millsp.
Spilanthes americana (Mut.) Hieron. f.
lanitecta A. H. Moore.

(13) *Bambonal*. A very characteristic association is that of the banks of streams in which there is constantly or generally running water. The character plant in many places is a viciously spiny bamboo, *Guadua* sp. This association soon drops out after the Peten is entered, as the higher limestone country is underdrained and the channels have no water during the dry season. It was last seen at Holmul in the Peten. The river bank associations have been described by Lundell (see p. 8).

(14) *Arenal*. One of the habitats which takes its name from the nature of the soil rather than the plant association is the *arenal*—a sandy, but well-drained, or at least not sour-soiled, place. The word is applied to sandy beds of dry arroyos, and also to sand banks or sand bars exposed at low water along streams. A characteristic plant is *Xanthosoma*, with which grow a variety of herbs such as species of *Ageratum*, *Acalypha*, grasses, sedges, etc. No *arenal* in British Honduras was carefully examined and listed, but the slight representation (probably not typical) of this association on sand bars in the dry Arroyo Uaxactun, at Uaxactun, had the following species in identifiable condition:

<i>Xanthosoma yucatanense</i> Engl.	<i>Priva lappulacea</i> (L.) Pers.
<i>Acalypha villosa</i> Jacq.	<i>Physalis</i> sp.
<i>Acalypha</i> sp.	<i>Lobelia berlandieri</i> DC.(?)
<i>Arthrostylidium pittieri</i> Hack.	<i>Eupatorium pycnocephalum</i> Less.
<i>Phyllanthus feras</i> Standl.	<i>Bomeria ulmifolia</i> Wedd.
<i>Dryopteris patens</i> (Sw.) Kuntze	<i>Stenandrium subcordatum</i> Standl.
<i>Dryopteris subtetragona</i> (Link) Maxon	<i>Optismenus hirtellus</i> (L.) Beauv.
<i>Polypodium phyllitidis</i> L. (as a terrestrial plant)	<i>Panicum virgultorum</i> Hack.
<i>Rousselia humilis</i> (Sw.) Urb.	<i>Selaginella</i> (Bartlett 12542)

This paper has been lying about two years unpublished, but has been accessible to Lundell, who has cited the manuscript. His more extensive studies exemplify the use of the field method and contain much more detailed lists for some of the same plant associations that I have described. He has studied them at other places and has been able to present a general account of the plant formations and associations of the entire Yucatan Peninsula. One of his longer contributions has been cited (see page 8) and a still more extensive one is now in preparation and will be published as "Botanical Studies in the Department of Peten, Guatemala." I have had the advantage of consulting Mr. Lundell's unpublished work, as he has had of seeing mine, and many of our ideas have developed in partnership. The writer still plans to write a somewhat more extended account of the Mountain Pine Ridge of British Honduras, based upon observations made in 1931, but Mr. Lundell's more extensive experience makes it desirable to leave further and more detailed publication on the phytogeography and ecology of the Peten forest to him.

DESCRIPTION OF PLATE 1

FIG. 1—Pine ridge near aviation field, Belize, with low foreground occupied by stretch of sedge savanna (*sabana*), at edge of which, on left, one of islets of *pimenta* palm (*Acælorraphe pinetorum*) just shows; pines (*Pinus caribæa*) and oaks (*Quercus oleoides* var. *australis*) in background.

FIG. 2—View of vegetational islet in pine ridge at Cornhouse Creek, Manatee River, Belize District. Plant association is the *encinal*, composed primarily of *Quercus oleoides* var. *australis* bordered by *pimenta* palm, *Acælorraphe pinetorum*. Picture was taken from stretch of sedge *sabana*.



FIG. 1



FIG. 2

DESCRIPTION OF PLATE 2

FIG. 1—View in pine ridge north of aviation field, Belize, showing alternation of pine association proper (*pinar*) in background with areas of sedge *sabana* which are dotted here and there with small *pimenta* islets. The latter contain as chief woody dicotyledon the *haha* (*Curatella americana*) which is the little irregular tree at left. Sometimes the *haha* and the *nanze*, *Byrsonima pulchra*, form islets without the *pimenta* palm, the association being then called *chaparral* (from *chapparo*, an erroneous popular name of the *haha*) or *nanzal*.

FIG. 2—*Crescentia cujete* L., a characteristic tree of coastal pine ridges, which often grows in *sabana* areas as isolated individuals. Pine ridge north of aviation field, Belize.



FIG. 1



FIG. 2

DESCRIPTION OF PLATE 3

FIG. 1—Edge of clearing at Uxactun, Peten, looking down into low flat that was occupied by *escobal* and *botanal* prior to clearing. Land rises at edge of the clearing to climax forest, *caobal*. The gigantic mahogany tree, *Swiecenia macrophylla* King (note man at base) is locally known as *caoba* from which name the association gets its designation. At right are two *botan* palms (*Sabal morrisiana* Bartlett), almost as tall as the mahogany.

FIG. 2—The base of mahogany tree (*caoba*) in climax forest (*caobal*) near Uxactun, Peten. At right of trunk is a *Clusia*, one of species called *chunup* by the Maya. Below, its adventitious roots form arcuate stilts; above, they cling tightly to trunk of the *caoba*, surrounding it in large numbers, increasing in girth, undergoing lateral fusion by spontaneous grafting, and ultimately forming a tight collar or vest around doomed *caoba*. (See Plate 4, fig. 1.)



FIG. 2



FIG. 1

DESCRIPTION OF PLATE 4

FIG. 1—Same tree as shown in Plate 3, figure 2, photographed with camera pointing up almost vertically. Near top of picture adventitious roots of *chunup* are forming collar around the *caoba*.

FIG. 2—Base of a *uacut*, *Bernoullia flammea* Oliver, among ruins of Tikal, Peten. It is easy to imagine that this species, with its flaming orange flowers, may have had some esthetic or ceremonial significance to the ancient Maya that would account for its persistence amid the ruins, with such obviously valuable species as *ramon* (*Brosimum alicastrum*) and *chico zapote* (*Achras sapota*). Left, Mercedes Chanek; right, Percy Gentle.

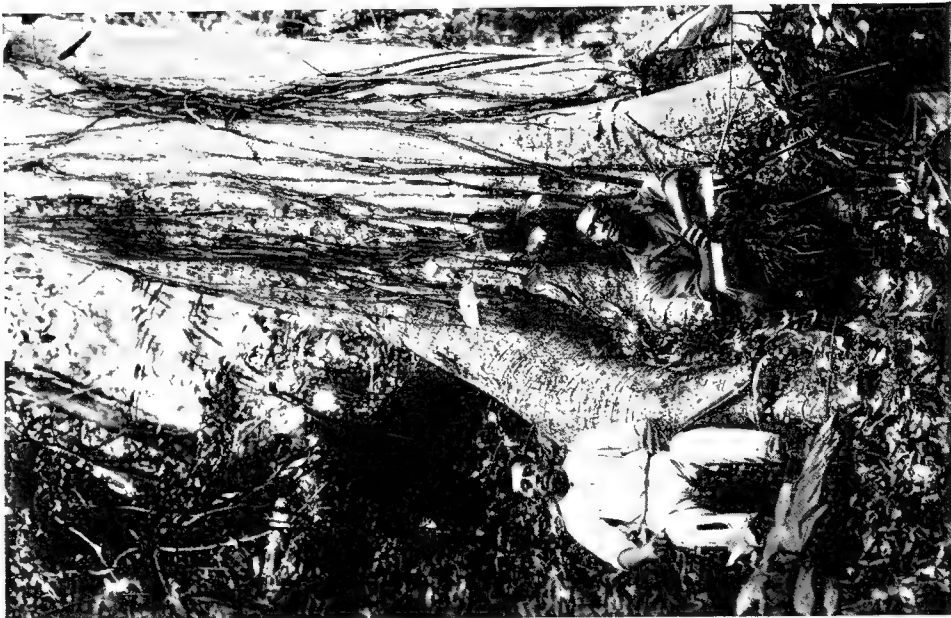


FIG. 2



FIG. 1

DESCRIPTION OF PLATE 5

FIG. 1—Photograph (from one of the pyramids) of top of a *naaut*, *Bernoullia flammea*, which is locally abundant at Tikal and characterizes the *nautil*, a phase of *ramonal* in which the *ramon* is not dominant. In background is a temple-crowned pyramid covered with forest (*higueral de las ruinas*).

FIG. 2—Maya ruins covered with vegetation. (Temple 18, Group A, Uaxactun, Peten.) Larger trees on ruins are generally *Ficus lapathifolium* (Liebm.) Miq.



FIG. 2



FIG. 1

DESCRIPTION OF PLATE 6

FIG. 1—View in *botanal* near Tikal, Peten, Guatemala. This association is characterized by the *botan* palm, *Sabal morrisiana* Bartlett, of which a young stemless individual is shown. Note that petioles of gigantic leaves are four times the height of man at base of plant, *i.e.* about 7 meters tall. Blades of larger leaves have spread of about 2 meters.

FIG. 2—Picture taken in same *botanal* at Tikal as figure 1. At a somewhat open place in forest the camera was pointed up vertically in order to photograph silhouette of crown of a *botan*, *Sabal morrisiana* Bartlett. Branched inflorescence exceeds leaves in length.

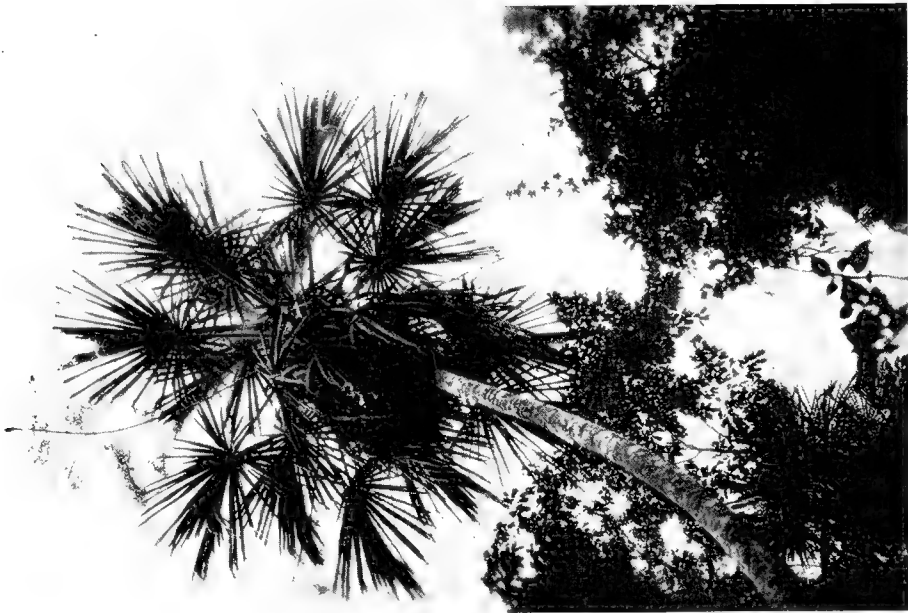


FIG. 2



FIG. 1

DESCRIPTION OF PLATE 7

FIG. 1—*Escobal* at Uaxactun, Peten, characterized by *escoba* or "give-and-take," *Cryosophila argentea*. Slender thorny trunk is obscured by petioles of collapsed dead lower leaves. At right is Mercedes Chanek of El Cayo, the writer's Maya assistant. He was the principal informant (although there were others) with regard to the local classification of plant associations in Peten and bordering British Honduras. This paper may be looked upon as very largely a statement in botanical terms of what this illiterate old Indian could tell about plant life of his environment. Much of whatever success the writer's work may have had was the result of his kindliness and untutored wisdom.

FIG. 2—Tangle of clambering bamboo (*Arthrostylidium pittieri* Hack.) and climbing palm (*Desmoncus uaxactunensis* Bartlett) at edge of an *escobal*, characterized by the *escoba* or "give-and take." *Cryosophila argentea* Bartlett. Photograph taken from natural opening provided by an *arroyo* bed.



FIG. 1



FIG. 2

DESCRIPTION OF PLATE 8

FIG. 1—View near Tikal, Peten showing, especially, climbing palm *Desmoncus ferox* (actual type specimen, *Bartlett 12584* in upper center), at border between the *pital* (edge of *aguada*, characterized by *Ananas magdalenæ*) and the *escobal* (characterized by give-and-take palm, *Cryosophila argentea*). The give-and-take (fan-like leaves in right foreground) gets its name from the dense investiture of the trunk with spine-like branched roots. Whoever brushes against this palm gives some tatters and takes some brittle, loose spines.

FIG. 2—Thicket of climbing palm, *Desmoncus uaxactunensis* Bartlett, photographed from a natural opening (bed of arroyo) in the *escobal* association, characterized by the *escoba* or “give-and-take,” *Cryosophila argentea* Bartlett. Uaxactun, Peten.



FIG. 1



FIG. 2

DESCRIPTION OF PLATE 9

FIG. 1.—Leaf, inflorescence and spathe of type specimen of *Desmoncus uaractuncensis* Bartlett. Leaflets are borne in somewhat interrupted groups. Terminal leaflets are transformed into reflexed spines (as in all members of the genus) but the offensiveness of the species to the unwary traveler is mainly on account of the sharp spines of the leaf sheathes and leaves. The tough, pliable wood of several species of *Desmoncus* is very useful in basketry, whence the name "basket-tie-tie" in British Honduras.

FIG. 2.—*Desmoncus uaractuncensis* Bartlett. Part of type specimen, also illustrated in figure 1 (*Bartlett 12576*).

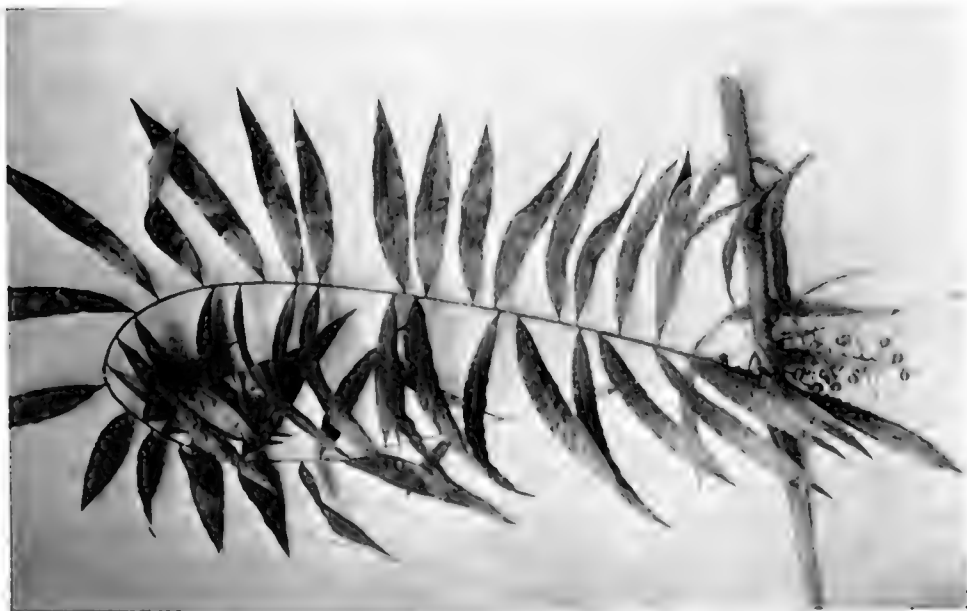


FIG. 2



FIG. 1

DESCRIPTION OF PLATE 10

FIG. 1—*Opsianura maya* Cook, previously unillustrated; one of the characteristic palms of the Peten forest. (It extends to El Cayo in British Honduras, *Bartlett 11577*.) Cook described this species from Laguna Colorado and Uaxactun, Peten, and said of it that it was especially characteristic of the vegetation of the old Maya ruins. It is known to the Maya as *c'ambo*. Uaxactun, Peten (*Bartlett 12423*).

O. F. Cook, *Opsianura*, a New Genus of Palms growing on Maya Ruins in Peten, *Guatemala*. Jour. Wash. Acad. Sci., vol. 13, 179-184, 1923.

FIG. 2—Frond (about 3 m. long) and infructescence of *Opsianura maya* Cook, from specimen shown in figure 1 (*Bartlett 12423*). At left, Percy Gentle, of Belize, trained as a botanical collector by the writer during 1931 season and still (1935) continuing under direction of Mr. Lundell to do excellent work, supplementing that of the expeditions. His specimens have been discriminatingly collected and of excellent quality. His intelligent interest in the vegetation and alertness in collecting are gratefully acknowledged by the writer.



FIG. 2



FIG. 1

DESCRIPTION OF PLATE II

FIG. 1—Inflorescence of *Opsianura maya*, from same tree as shown in Plate 10. It is about 60 cm. long.

FIG. 2—Inflorescence of *Opsianura maya*, from same tree as shown in Plate 10. It is about 60 cm. long.



FIG. 2



FIG. 1

DESCRIPTION OF PLATE 12

FIG. 1—One of the *aguadas* at Uuxactun, Peten. This particular one has the surface covered with *lechuga* (*Pistia stratiotes* L.) and is therefore a *lechugal*. The shrub in the background is *Eschynomene decan*i Robins. & Bartl., called by the Maya *zinzinac'ax* (Bartlett 12351).

FIG. 2—*Renalmia occidentalis* (Sw.) Sweet, a wild ginger that generally grows near the *aguadas* and also in the *caobal*. It is about 8 feet tall. The yellow flowers, dark purple fruit (red until fully ripe), and fine aroma make it a most attractive plant. Uuxactun, Peten (Bartlett 12450).



FIG. 2



FIG. 1

DESCRIPTION OF PLATE 13

FIG. 1—*Asplenium formosum* Willd. growing on decaying logs in the *caobal* (climax mahogany forest), Uaxactun, Peten (*Bartlett 12179*). It is also found on the ground among the ruins, in the wetter places.

FIG. 2—*Asplenium dentatum* L. covering limestone ledges on steep slopes (*pedregal* association) near Uaxactun, Peten (*Bartlett 12787*). It likewise grows on the ruins, much more abundantly than *Asplenium formosum*, and nearly always on limestone.



FIG. 1



FIG. 2

DESCRIPTION OF PLATE 14

Fig. 1—*Dioscorea bartlettii* Morton. From standpoint of habit and morphology perhaps the most interesting plant of the Peten forest. It is doubtless closely allied to a species described from Vera Cruz as *Testudinaria cocolmeca* Procopp. The latter, however, has the aerial tuber broad, depressed, and concave at the top. The two are alike in that the tuber is covered with corky polygons. In *D. bartlettii* it is sometimes 12 to 18 inches high, and often entirely above the soil, only the coarse roots anchoring it. One's fingers may be run in among the roots, between tube and soil. It was only by much search and chopping that fertile material was obtained. This photograph was made at Uaxactun, Peten, but the species was also seen at Tikal, Peten, and El Cayo, British Honduras. The fairly hard parenchymatous "wood" of the tuber carves easily without splitting, and is used for making the seals with which the chicleros stamp their bars of chicle gum.

Fig. 2—A slope in the *zapotal* (forest characterized by dominance of *Achras sapota* L.) where thin soil has washed off, exposing limestone, in which there are solution holes (or possibly artificial cavities?) that remain filled with water for several days after a rain. At end of dry season, but before *aguadas* have filled, knowledge of their location may be of great advantage to the chicleros. They are called "*sarsteneha hil ha*." Near Uaxactun, Peten.



FIG. 2



FIG. 1

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

II

**VARIOUS PALMÆ CORYPHEÆ OF CENTRAL AMERICA
AND MEXICO**

BY HARLEY HARRIS BARTLETT

With twelve plates

[Issued July 10, 1935]

VARIOUS PALMÆ CORYPHEÆ OF CENTRAL AMERICA AND MEXICO¹

Three biological expeditions of the University of Michigan in collaboration with the Carnegie Institution of Washington (1931, 1932, 1933) have accumulated a considerable amount of excellent material of the palms. These plants, poorly represented in most herbaria because specimens have to be inconveniently bulky for transportation in the field and also because they are often so viciously spiny, have been given especial attention by our expeditions, for the reasons that they are key plants in determining phyto-geographical relations and much aboriginal technology is based upon their utilization.

The proper understanding of the palms of the Maya area in a strict sense demands a study of those that grow in regions adjoining. The identification of the species represented in our own collections has led me to reach conclusions regarding others that are extralimital, but for the convenience of other botanists all the results are presented together. In particular, the collections of Mr. O. F. Cook and his associates from Panama northward to Mexico have been especially important. These are represented for the greater part only in the United States National Herbarium. Much of the unidentified material has therefore been segregated and held for study by Mr. Cook himself. I am very greatly indebted to him for permission to utilize specimens that had a bearing upon my studies. He has likewise favored me with several excellent photographs which are individually acknowledged. To Dr. William R. Maxon of the National Herbarium I am deeply indebted for numerous courtesies in connection with the study of the collections in his care.

THE GENUS *BRAHEA*

The placing of the new species which it has been necessary to add to the genus *Acælorraphe* has involved consideration of the limitations of *Brahea*. The genus *Brahea* of Martius, as treated by Beccari,² consists of discordant elements. The type species, *Brahea dulcis* (H.B.K.) Mart., is fortunately sufficiently distinct to be maintained as a good generic type, but the species with glomerate flowers subsequently added by Beccari are better placed in *Acælorraphe*. The writer, in removing the latter elements from *Brahea*, leaves it with three species that certainly are congeneric, namely, the original *B. dulcis* of western Mexico, *B. berlandieri* of Nuevo Leon, and the

¹ Papers from the Department of Botany and Herbarium of the University of Michigan, No. 511.

² Odoardo Beccari, *Asiatic Palms—Corypheæ*: Posthumous work by Dr. Odoardo Beccari revised and edited by Professor Ugolino Martelli, Ann. Roy. Bot. Gard. Calcutta, vol. XIII, 1931. (The supplement of this work, pp. 287-344, entitled "Neogean Corypheæ," is an abstract, with additions and corrections, of Beccari's monograph "Le Palme americane della Tribu delle Corypheæ," published in vol. II of U. Martelli's "Webbia," 1907.)

new *B. konzattii* of Oaxaca. The latter two are very close to the type species and fall into *Brahea* with no distortion of the generic character. In addition, there is *Brahea calcarea* Liebm., a species with slender flowering axes and solitary flowers, which also seems somewhat discordant with the other species in its unarmed petioles and non-filiferous leaves. I have not seen any material certainly of this species, and not knowing of any more fundamental differences can suggest no other place for it than in *Brahea*.

The three certain species of *Brahea* have solitary flowers imbedded in the dense thick tomentum of the rhachis and with the substipitate sepals totally free from each other clear to the base. They may be separated as follows:

- Corolla in bud conspicuously retuse at apex; buds only about 2 mm. long,
but distinctly longer than thick.....*B. konzattii*
Corolla in bud not retuse.
Buds 3 mm. long, longer than thick; ultimate speciform branches of
inflorescence 4-16 cm. long.....*B. dulcis*
Buds 1.4 mm. long, thicker than long; ultimate branches of inflorescence
1-4 cm. long.....*B. berlandieri*

Brahea konzattii sp. nov. Arbor? Folia flabelliformia. Petioli in parte superiore ca. 18 mm. lati, subglabri, margine dentibus acutis numerosis 2 mm. longis armati. Plicaturæ foliorum utrinque ca. 62. Ligula ca. 16 mm. longa, chartacea. Rhachis in pagina inferiore ca. 3.5 cm. tenuiter prolongata. Laminæ segmenta filis interrupta, longiora 70 cm. longa, 26 mm. lata, glabrata, juventate floccoso-tomentosa, pilis sordidis intricatis. Spadix plus quam 1 cm. crassus spathis tubulosis pluribus praeditus, ex quibus inflorescentiæ partiales non tubuloso-spathaceae solum bracteatae extant sunt. Inflorescentiæ partiales bis terve ramosae, probabiliter 60 cm. longae (sola una incompleta visa), juventate ochraceo-tomentosae demum griseae, ramis ultimis floriferis 4-9 cm. longis, ante anthesin 2 mm. crassis, post anthesin, floribus densis inclusis, 5 mm. crassis, tomento denudato solum 1 mm. crassis. Flores in tomentum solum immersi nec in axe proprio. Flos maturus sed nondum expansus 2.2 mm. longus, 1.5 mm. latus, apice manifeste retusus. Calyx a bractea annuliformi vel cupuliformi 1.8 mm. diametro circumdatus: bractea ex limbo minuto triangulo densissime tomentoso continuo cum appendice annulata flavescenti multifimbriata constans. Calyx trisepalus, sepalis distinctis liberis imbricatis rigidis, latioribus quam longioribus, 1.3 mm. latis, 1.1 mm. longis, infra mediam partem subauriculatis stramineis, margine hyalinis, supra mediam atratis et tomentosis, basi substipitatis, apice subacutis vel obtusis. Petala basi cohærentia, valvata, 2 mm. longa, 1.3 mm. lata, fere glabra, fusco-straminea. Stamina 6, antheris ovato-cordatis 1 mm. longis paullum infra dorsi apicem affixis, ad basin alte cordatam annulum stamineum attigentibus; filamentis crassiusculis deorsum expansis in annulum carnosum ad petala omnino adnatum. Ovarium turbinatum glabrum ex carpellis 3 deorsum liberis, sursum in stylum communem connatis, supra æquatorem obscure 5 umbonatis constans. Fructus ignotus.—Specimen typicum legit C. Konzatti, n. 1717, Mexico, "Estado de Oaxaca, Cuesta de Salomé, 1000 ft., Feb. 1906," in U. S. Nat. Herb. (n. 572179) conservatum. A *B. dulci* differt floribus minoribus; gemmis retusis, petalis non manifeste longitudinaliter venosis; sepalis rigidioribus apice valde tomentosis; auriculis sepalorum non fimbriatis, bractea floris una (vel pluribus) annulum fimbriatum formante; petalis

basi minus cohaerentibus; antheris pro rata grandioribus. In *B. dulci* florum gemmæ non retusæ sunt 3 mm. altæ, 2 mm. crassæ, a bracteis 1 vel 3 tomento immersis circumdatæ sed eis non lateraliter connexis annulum fimbriatum formantibus; antherae sunt eis *B. konzatti* aequilongæ.

In comparison of these species I have interpreted as typical *B. dulcis* such material from western Mexico as *Ortega 5630*, vicinity of Mazatlan, Sinaloa (U. S. Nat. Herb.), with which *Liebmann 10799* from Chapuleo, Puebla, agrees very well.

Brahea berlandieri sp. nov. (Verosimiliter *B. dulcis* var. *montereyensis* Beccari in Ann. Roy. Bot. Gard. Calcutta 13: 305. 1931.) Folia desunt in specimine descripto. Ramus florifer (spadix) plurispathus. Inflorescentiæ partiales 3 superiores 10 - 20 cm. longæ ex spathis rufis 3.5 - 7 cm. longis, conicæ, densæ breviter pedunculatæ, bis terve ramosæ, non spathas tubuliformes sed bracteatas solas ferentes, ramulis ultimis rigidis 1 - 4 cm. longis densissime tomentosis. Florum gemmæ basi in tomentum rhachidis immersæ apice obtusæ, 1.4 mm. altæ, 1.7 mm. latæ. Sepala 1.3 mm. longa, 1.5 mm. lata, omnino libera, fere glabra sed dorsaliter infra apicem pubescentia margine deorsum glabra, centro valde carnosâ incrassata, margine hyalina, tenuia, lateribus supra basin angustatam substipitatam crinita, apice rotundata vel obtusissima. Petala ad basin connata atrocolorata 1.5 mm. longa 1 mm. lata. Antheræ 0.7. mm. longæ, ovatæ, supra dorsi medium fixæ. Filamenta gracilia subito expansa in annulum stamineum parvum. Ovarium atro-coloratum.—*Berlandier 3216* in U. S. Nat. Herb., specimen solum visum, fide cl. Hemsley e Serro de la Silla, prope Monterrey, Nuevo Leon, Mexico.

Beccari separates his var. *montereyensis* from typical *Brahea dulcis* by its larger flowers, 3 instead of 2 mm. long. Since typical *B. dulcis* of western Mexico has the flowers 3 mm. long, and those of the Monterrey material are 2 mm. long, I suspect a clerical error. It seems most unlikely that at its northern outpost *Brahea* is represented by two types, but in view of the clear discordance between Berlandier's specimen (which is the only one I have seen from Neuvo Leon) and Beccari's description, I do not venture to assume their identity and merely to raise *B. dulcis* var. *montereyensis* to specific rank. The type specimen of *B. berlandieri* has the buds mature (as shown by the beginning of dehiscence of the petals in some pikes) but is not in full anthesis. There is no likelihood that the buds would have elongated 50 per cent before opening fully.

A BROADER DEFINITION OF ACCELORRAPHE

Among the palms that should not remain in *Brahea* if the latter is to remain definable are (1) *Brahea calcarea* Liebm., of which I have not seen authentic material but which I consider as probably or possibly incongruous because of its lack of petiolar teeth and intersegmental threads, and (2) those species in which some of the flowers are in glomerules of about 3 with the calyx segments free and distinctly imbricating above, but united below into a massive fleshy base. These, since they do not appear to be generically

separable, should go as a group to *Acælorraphe*. In my opinion the latter genus should be defined broadly enough to include even *Serenoa*. I therefore transfer to *Acælorraphe* the species artificially associated with *Brahea*, at the same time describing a new species from Guatemala of the same affinity. Those to whom Beccari's concept of *Brahea* appears natural will consider the new species, *A. cookii*, as a *Brahea*, and those who approve very small genera in the *Palmae* may possibly consider the group of species as forming a distinct genus. It would be, however, most difficult to define, for only the comparatively lengthy extension of the rhachis into the blade, the abundant, intricately branched and twisted squamose pubescence, the slightly auriculate corolla segments, the widely flared star-like staminal cupula (rather than annulus) and the larger size of the plants, appear to provide useful distinctions from the group containing *Acælorraphe wrightii* and *A. pinetorum*. The two species removed from *Brahea* to *Acælorraphe* and the new related species may be distinguished as follows:

Calyx and corolla tomentose. Ovary hairy above.....*A. pimo*

Corolla glabrous

Ovary glabrous*A. salvadorensis*

Ovary white tomentose below, especially so as fruit develops, when basal growth of the tomentose part minimizes small apical glabrous

portion*A. cookii*

Acælorraphe pimo (Becc.) comb. nov. *Brahea pimo* Beccari, Webbia 2:103. 1907; Ann. Roy. Bot. Gard. Calcutta 13:305. 1931. I have seen no authentic material of this species, but confidently refer to it *Arsene 6046* and more doubtfully *Arsene 2826* (sterile), both from Morelia, State of Michoacan, Mexico (in U. S. Nat. Herb.).

Acælorraphe salvadorensis (H. Wendl. ex Becc.) comb. nov. *Brahea salvadorensis* H. Wendl. (nomen in Herb. Berol.); Beccari, Webbia 2:105. 1907; Am. Roy. Bot. Gard. Calcutta 13:305. 1931. This is a species which I have not seen, but from the description and figures it seems to be undoubtedly closely allied to *A. pimo* and *A. cookii*.

Acælorraphe cookii sp. nov. Arbor mediocris. Folia ex vaginis amplis tenuibus rufis glabris chartaceis deorsum nitidis sursum in fibros molles dissolutis; petiolis basi 4 cm. latis, rubris, glabris, nitidis, medio 18 mm. latis, ad apicem versus 15 mm. latis, pallidis, stramineo-viridibus, marginibus dentatis, dentibus acutis incurvatis propinquis armatis, juventate dense furfuraceo-lanosis, pilis squamiformibus ramosis intricatis pallido-cinnamomeis, 5 mm. longis; ligulis 20-25 cm. longis, bilobatis, chartaceis, lobis triangulis, apice attenuatis margine dense fimbriatis; laminis juventate ad venas floccoso-cinnamomeo-furfuraceis utrinque ca. 70 plicatis; segmentis non filis interjectis, ca. 85 cm. longis, ca. 18 mm. latis, apice 5-10 cm. bifidis, ætate glabris; rhachide angusta in laminam ca. 12-14 cm. extensa. Ramus florifer (spadix) longitudine ut videtur 1.5 m. excedens, plurispathus, (spathis plus quam 7?) basi 15 mm. crassus colore stramineus et rufotinctus; spatha infima plus quam 35 cm. longa, apice oblique aperta, acuta, rubra rigidiuscula tubulosa inflorescentiam partialem plus quam 70 cm. longam ferente; media inflorescentiam ca. 50 cm. longam ferente; penultima 10 cm. longa, inflorescentiam partialem 25-30 cm. longam ferente; ultima 6 cm.

longa, 7 mm. diametienti. Inflorescentiæ partiales bis (terve) ramosæ non spathiferæ; ramus ultimis floriferis laxis modice griseo-tomentosis 10-18 cm. longis. Flores vel terni glomerulati vel prope apicem ramulorum singuli, brevissime pedicellati, pedicellis calyce basi excavato occultis. Calycis segmenta 3 basi coalescentia cupulam 2 mm. diametientem, 1.5 mm. altam, basi trigibbam, centro ad pedicelli insertionem excavatam, textura carnosam crassam formantia, sursum distincta, rotundata, centro et basi tenuiter pubescentia, marginibus atratis conspicue imbricatis tenuibus glabra, parte libera 1.5 mm. lata, 1 mm. longa, paullum infra apicem atrata, incrassata, subapiculata. Corolla (petalis applanatis) 3.5 mm. longa, 2 mm. lata, segmentis 3 liberis reflexis 2 mm. longis, sursum glabris, deorsum sub-tomentosis, parte basali cupuliformi 1 mm. alta, basi ad cupulam stamineam adnata. Cupulæ staminæ pars ad corollæ basin adnata 1.5 mm. alta, pars libera astriformis 5.5 mm. patens, filamentis 6 carnosis deltoideis radiatis. (Antheræ in specimine typico delapsæ sunt; in specimine altero 1.3 mm. longæ, sagittatæ, paullum infra dorsi medium affixæ.) Ovarium ex carpellis 3 deorsum distinctis non sculptis non umbonatis sursum in stylum commune brevem coalescentibus constans, parte superiore glabrum, parte inferiore tomentosum, demum, fructibus crescentibus, conspicue densissimeque albitomentosum. Fructus oblongi, plus quam 1 cm. longi (maturi non visi).—Legit *O. F. Cook* et *C. B. Doyle*, no. 275 (specimen typicum conservatum in U. S. Nat. Herb.), 276, et 277 "between Santa Rosa and Salama, State of Alta Vera Paz, Guatemala, 29 May, 1904"; no. 297 "between Salama and Purula, 4 June, 1904."

A CENTRAL AMERICAN ACCELORRAPHE IN THE NARROW SENSE

The following species is truly a close relative of *Accelorraphe wrightii* (Griseb.) Wendl., the type species of the genus.

Accelorraphe pinetorum sp. nov. Arbor parva 3-5 m. alta, 5-8 cm. diametro, trunco inermi. Folia flabelliformia utrinque ca. 44-plicata, vaginis rufo-brunneis, glabris, nitidis, apice in fibros dissolutis; petiolis 25-35 cm. longis pallide viridibus infra convexis supra planis, margine dentatis vel denticulatis, dentibus inferioribus rufidulis patentibus vel sursum curvatis (raro recurvatis) margine cartilagineo conjunctis, superioribus gradatim brevioribus; ligula submembranacea vel pergamentacea, brunnea, ca. 16 mm. lata, 4 mm. alta, in cristam 2 mm. altam sedente; foliolis pallidis, fere glabris vel subtilissime albipubescentibus, longioribus ca. 40 cm. longis, inferioribus ca. 3 mm. latis, mediis ca. 10 mm. latis. Ramus florifer (spadix) ca. 1 m. longus. Spatha infima rufida semicylindrica 14 cm. longa, 12 mm. lata, apice bilabiata, glabrata sed præcipue marginibus juventate floccosopilosa, pilis valde ramosis intricatis. Spatha secunda minor, sterilis; tertia et 6 sequentes ramulos albitomentosos ferentes; ramulis primariis ca. 25 cm. longis vel brevioribus, ramulos secundarios et tertiarios ferentibus, solum ultimos (vel secundarios vel tertiarios) floriferos. Flores subsessiles (ut videtur sessiles sed vero brevissime pedicellati, pedicellis calyce concavo occultis) terni vel singuli densiuscule in ramis ultimis 5-12 cm. longis crispo-albo-tomentosis alternantes, bracteolis minutis brunneis scariosis caducis subtentibus; petalis nondum apertis gemmæ 2 mm. longæ, 1.3 mm. latæ. Calycis segmenta 3 pallide brunnea, ca. 1 mm. longa, 1.3 mm. lata, basi

connata valde carnosae, apice libero membranaceae, conspicue multifimbriatae. Corolla tripetala siccitate pallide brunnea, conspicue et praecipue marginibus albilineata, petalis solum basi connatis, valvatis, carnosis, glabris, rigide canaliculatis, 1.7 mm. longis, 1.3 mm. latis, intus profunde et permanenter a antheris annuloque stamineo impressae cavatis. Stamina 6 summam gemmae occupantia, antheris ovatis 0.35 mm. longis, in dorsi medio affixis; filamentis sursum tenuibus, deorsum abruptissime expansis et lateraliter connatis in anulum stamineum album carnosum basi corollae adnatum. Ovarium subglobosum trilobum ex carpellis 3 constans deorsum distinctis sursum in stylum tenuem communem conjunctis. Fructus ovoideo-globosus, ca. 8 mm. longi, 7 mm. diametientes, breviter pedicellati, pericarpio tenui carnosio ad endocarpium subcartilagineum adhaerente, endospermate aequabili.—Specimen typicum legit H. H. Bartlett, No. 11201, in pineto prope Belize, British Honduras, 28 Jan. 1931; conservatum in herb. Univ. Mich. Ab *Acælorraphe wrightii* differt calyce valde fimbriato nec integro; floribus colore pallide brunneo nec atrato; petalis albilineatis nec concoloribus; petalis fere hucusque ad basin liberis nec ad tertiam partem; staminibus albis nec atromaculatis vel atrotinctis; filamentis abrute vel exacte rectangulatim nec gradatim in anulum stamineum transeuntibus.

The known range of *Acælorraphe pinetorum* is indicated by the following specimens: British Honduras, pine ridge north of aviation field, Belize, Bartlett 11201; Baker's Pine Ridge, Belize District, where it is known as "hairy tom palmetto," C. L. Lundell 3813; Big Fall Pine Ridge, Belize River, C. L. Lundell 4333; Little Cocquericot, Belize River (where it is called "papta" or "prementa"), C. L. Lundell 4336; Mountain Pine Ridge, El Cayo District, Bartlett 11814a; Campeche, in savanna and along river, Champoton, W. C. Steere 1838; Hacienda San Pablo, near Champoton, G. N. Collins 53.

The "hairy tom palmetto" or "pimenta" of British Honduras, which forms island-like clumps in the "pine ridges" and coastal savannas is one of the most common and conspicuous plants of the colony. Nevertheless, it seems not to have been described. Obviously of very close affinity to the West Indian and Floridan *Acælorraphe wrightii* (Griseb.) Wendl. or *Paurotis wrightii* (Griseb.) Britton, it differs in a number of minute but definite floral characteristics that are sufficient to give it specific status. In describing it as *Acælorraphe*, I must state that I find no distinction of generic importance between this genus and *Serenoa*. If *Acælorraphe* is not to be considered as validly published, then this species, *A. cookii*, *A. wrightii* and the species transferred from *Brahea* may well be put under *Serenoa*, with advantage, as indicating a very close relationship. The characteristics of anthers and seed so clearly expressed in Small's new *Manual of the South-eastern Flora* are not trustworthy. Careful dissections of flowers of West Indian and Central American specimens show no anthers resembling those in the figure given by Small for *Paurotis wrightii* (Griseb.) Britton. If the Florida plant is accurately figured, it is surely very distinct from the West Indian.

THE PALMETTOS OF THE MAYA REGION

Beccari in his treatment of the genus *Sabal* has doubtfully ascribed the Cuban *Sabal japa* Wright to Yucatan. The available material from the Yucatan Peninsula is ample and clearly distinct from *S. japa*. Interestingly enough, although *S. japa* does not reach the mainland, so far as we have evidence, there is Cuban material from Pinar del Rio, the western end of the island, which has been (as I believe) incorrectly associated with *Sabal japa* and really belongs with the new species, which I here describe as *Sabal (Inodes) mayarum*. In order to make the distinctions of the latter as clear as possible, I add a new, comparable description of *S. japa*, drawn from the type specimen itself. With regard to the spelling "Japa" rather than "Yapa," I have preferred the spelling of Wright's own label, which has indeed had greater currency, until recently, than "Yapa" which has lately been revived by Beccari.

Sabal mayarum sp. nov. Arbor humilis 4 m. alta. Folia ampla flabelliformia, laminis ca. 2 m. diametro; petiolis apice ca. 2 cm. latis, in ligulam triangulam 2.5 cm. longam acutam et rhachidem tenuem ca. 60 cm. longam productis; segmentis numerosis, eis terminalibus ex rhachidis superiore parte orientibus fere usque ad apicem conjunctis, eis lateralibus basalibusque profundius fissis, haud filiferis (in specimine typico) vel interdum filis præditis, 3-3.5 cm. latis, unicostatis, parte libera ca. 25-30 cm. longa; rhachide supra ad ligulam versus in cristam acutam tenuem elevata. Spadix ter ramosus, longus, basi 2.5 cm. crassus, spathis cylindricis tectus, infimis oblique in appendicem triangulam foliaceam 10 cm. longam productis, superioribus secundariisque orificio coloratis breviter et triangulatim in limbum liberum productis; ramulis ultimis floriferis non spathulatis sed bracteolis minutis subtentis. Bracteolæ florales 3 parvæ, centralis late triangula 1.3 mm. lata, 1 mm. longa, laterales minores, asymmetricæ. Flores maturi nondum aperti 3 mm. longi 2.25 mm. crassi. Calyx non costulatus glaber 1.5 mm. altus, cupulatus, basi retusus subtrigibbus, connatus, sursum divisus in 3 segmenta lata obtusa, textura carnosus non venosus. Petala libera ovata, 2.5-2.8 mm. longa, 1.5-2 mm. lata, extus (sicca) non venosa, intus obscure 5-7-venosa. Stamina 6, filamentis 2.5 mm. longis pallide coloratis triangulis carnosus basi lateraliter breviterque connatis et ad petala adnatis; antheris ovato-sagittatis 1 mm. longis medio dorso affixis. Pistillum conicum triloculare vix 2 mm. longum, stylo crasso, apice stigmatoso—British Honduras, Maskall, Belize District, *Percy H. Gentle* 1156 (specimen typicum in Herb. Univ. Mich.); Corozal District, *Percy H. Gentle* 602 et 628, sub nom. vernac. "botan"; Mexico, Yucatan, Merida, *Schott* 196, sub nom. vernac. "huano"; Chichankanab, *G. F. Gaumer* 1359; sine loc., *G. F. Gaumer* 21464, 21466, et (verosimiliter) 23967; Cuba, Province of Pinar del Rio, Galafre, *N. L. Britton* and *J. F. Cowell* 9845.

Other specimens which may possibly belong here I do not venture to cite. The reason for caution in the association of sterile and fertile collections of different places or dates, until all the species are well known, is that at least one other related species of *Sabal* grows at Merida, Yucatan, represented by *Schott* 802, for which the collector recorded the name "huano var. chan," and two other species occur in the Maya area. One, which is

available so far only in fine fruiting specimens (*Bartlett 12284*, Uaxactun, Department of Peten, Guatemala) the writer intends to name, when flowering specimens come to hand, in honor of D. Morris, author of the interesting book *The Colony of British Honduras* (London, 1883). The other has been tentatively identified as *S. mexicana* Mart.

Fruiting material that is not accompanied by flowering specimens but may nevertheless represent *Sabal mayarum* is *Gaumer 23967*, although the intervals between leaf segments are non-filiferous; the segments are apparently 2-3-costate, about 2.5 cm. broad and 80 cm. long; the fruits, 1 cm. in diameter and slightly asymmetric, are borne on an accrescent base that retains the calyx segments and the shriveled remains of the corolla segments but appears to develop from the very base of the corolla and the tissues adnate to it. The fruiting part of *Schott 196* is quite similar except that the fruit is smaller, 7 to 9 mm. in diameter. It is associated with a good flowering specimen.

Sabal japa Wright. Arbor. Folia magna, segmentis ca. 120-150 cm. longis, 5 cm. latis, non filiferis, ca. 15-30 cm. infra apice bifidis, costa ad sinus basin terminanti; ligula 4-5 cm. longa, 1.5 cm. lata; rhachide in lamina ca. 60 cm. producta. Bracteolæ florales 1 vel 3, parvæ, 1.4 mm. latæ, 0.6 mm. longæ, textura firmæ. Flores maturi nondum aperti 5.5 mm. longi 3 mm. crassi. Calyx non costulatus, glaber, cupuliformis, 2 mm. diametro, vix 2.5 mm. altus, subtus retusus, basi connatus, sursum dimidia parte trilobus, sinubus acutis, apicibus obtusis. Petala 3.5 mm. longa, 3 mm. lata, ut videtur inter se distincta sed intus ad cupulam stamineam valde adnata, ergo coherencia, obscure 5-7-venosa. Stamina 6, filamentis basi ad petala adnata et lateraliter connata annulum brevem formantia, parte libera 2.5 mm. longa, carnosa, anguste triangula, pallide colorata; antheræ 1.7 mm. longæ, paullulo infra medium dorso affixæ. Pistillum 4.5 mm. longum, anguste conicum, triloculare.—Descriptio ex specimine typico cl. C. Wright, no. 3971, Cuba, in U. S. Nat. Herb., no. 33398.

Of this species there is no material in the National Herbarium except the type.

Sabal mexicana Mart. This palm was originally described from Oaxaca. The only Mexican material in U. S. Nat. Herb. from north to Tehuantepec that really seems to belong to *S. mexicana* was collected in Oaxaca by Liebmann (Nos. 10806 & 10807). It has the ultimate floriferous branchlets somewhat shorter than in the specimens from Yucatan, Guatemala and Salvador, but no sufficient specific difference is visible in the flowers. I suspect that the latter specimens may belong to *S. guatemalensis*, separated on the basis of differences in the fruit, but if two species are distinguishable in the material they are very close. For the present I prefer to call all the specimens *S. mexicana*. They are as follows: Oaxaca, prope mare Pacificum, S. Jago Estata, Oct. et Nov. 1842, *Liebmann 10806 & 10807*; Campeche, Yohaltun, *E. A. Goldman 539*; Guatemala, occupied clearing, La Libertad, Petén, *C. L. Lundell 3073* ("huano de sombrero," "bonxaan"); Gualan, Dept. Zacapa, alt. 122 m., *W. A. Kellerman 5007*;

Salvador, San Salvador, *S. Calderon 252* ("palma de sombrero; leaves used for brooms and young unopened ones for weaving hats").

ACANTHORRHIZA VS. CRYOSOPHILA

The generic name *Acanthorrhiza*, dating from ineffective incidental mention in 1869, was effectively established by Wendland in 1879 (Bot. Zeit. p. 147). It was immediately taken up by Bentham and Hooker (Gen. Plant., vol. III, p. 925, 1880) and by Drude (Fl. Bras. vol. III, pars 2, p. 554, 1882), and has since been maintained even by authors who also recognized the doubtful genus *Cryosophila*. The latter also had a bad start, for it was obscurely proposed by Blume in a footnote in one of his sumptuous publications on the East Indian flora (Rumphia, vol. II, p. 53, f. n. 1, 1836) to include only *Corypha nana* H.B.K. but without actual publication of the binomial *Cryosophila nana*, which is ascribed to Blume by Standley (Cont. U. S. Nat. Herb. 23:73. 1920). It appears from the diagnoses that Humboldt, Bonpland and Kunth described the same western Mexican palm twice, under the names *Corypha nana* and *Chamærops mocini*. *Cryosophila* is based upon the former, and the latter was associated with *Acanthorrhiza* by Bentham and Hooker. Before establishing *Cryosophila*, Blume had on an earlier page of the same work (op. cit. p. 38) redefined *Corypha* as exclusively Oriental, and had said that the American elements might go to *Brahea* and *Copernicia* of Martius. Liebmann, erroneously thinking that he had rediscovered *Corypha nana* H.B.K., disposed of his plant by placing it in *Copernicia* and making the name *Copernicia nana* (H.B.K.) Liebm. (published by Hemsley in Biol. Centr.-Amer. Bot. 3: 411, 1885). Liebmann's misidentified plant, however, was a *Brahea*, probably, as Beccari has said, *B. dulcis*. It is represented by a sterile but characteristic specimen (his no. 6593) in U. S. Nat. Herb. Wendland, in setting up the new genus *Acanthorrhiza*, merely carried on Liebmann's erroneous identification of the fictive Mexican *Copernicia* as *Corypha nana* H.B.K.

Cryosophila must therefore be interpreted in the light of the original description of *Corypha nana* H.B.K. If we discount as an error Kunth's placing of *Corypha nana* under a genus that he himself characterized as having free stamens (as we are well justified in doing in view of Kunth's inclusion of *Brahea dulcis* also in *Corypha*, although the stamens are clearly united), the rest of Kunth's description applies passably well to *Acanthorrhiza mocini*. Especially the description of the trunk is applicable to no known palm other than *Acanthorrhiza*, for an outer investiture of spine-like roots occurs in no other Mexican palm. The description of the stamens as included and shorter than the pistils simply means that the flowers were not fully in anthesis. Drude, to be sure, has described *Cryosophila* as having the stem invested with a thorny leaf-sheath net, but this seems to be merely his interpretation of Kunth's phrases "*Corypha caudice externe dædaleo-venoso*" and "*caudex . . . inermis, venis lignosis, dædaleis, pungentibus (ut in Poly-podio arboreo) arcte obsitus.*"

The points that seem to indicate the identity of *Corypha nana* H.B.K. and *Chamærops mocini* H.B.K. are that in both the petioles are smooth; the spathes are three or four, and obovate; the calyx and corolla are tripartite and nearly the same length; the former came from between Acapulco and Masatlan, the latter from Acapulco. (The Masatlan of Humboldt, Bonpland and Kunth is a place on the western side of the Sierra Madre in Guerrero, near Chilpancingo, not the well-known Mazatlan on the coast.) The fruit described for *Corypha nana* is like that of the palm currently known as *Acanthorrhiza mocini*. (The original description of *Chamærops mocinini* H.B.K. says "*Fructus ignotus*.") The original description of *Corypha nana* states that the spathes are tomentose outside, which is really true of *Acanthorrhiza mocini*.

The conclusion seems fairly warranted that *Cryosophila* is the same as, and has precedence over, *Acanthorrhiza*. Furthermore *Corypha nana* H.B.K. has precedence over *Chamærops mocini* H.B.K. The names of the accepted Mexican and Central American species should therefore be as follows:

- Cryosophila nana*** (H.B.K.) Blume ex Standley, Cont. U. S. Nat. Herb. 23:73. 1920.
Corypha nana H.B.K., Nov. Gen. et Sp. 1:299. 1815.
Copernicia (?) *nana* (H.B.K.) Liebm. in Hemsl. Biol. Sentr. Amer., Bot. 3:411. 1885 (as to synonym; the plant cited=*Brahea* sp.).
Chamærops mocini H.B.K., Nov. Gen. et Sp. 1:301-302. 1815.
Acanthorrhiza mocinini (H.B.K.) Benth. & Hook.
Trithrinax aculeata Liebm., in Mart. Hist. Nat. Palm. 3:320. 1849.
Acanthorrhiza aculeata Wendl. in De Kerch., Les Palmiers, p. 230.

The geographic range of *C. nana*, as indicated by specimens in the U. S. National Herbarium, is as follows: Mexico, Colima, Manzanillo, *Palmer 964*; Sinaloa, vicinity of Palmar, *Rose, Standley and Russell 14651*; Tepic, foothills between Acaponeta and Pedro Paulo, *J. N. Rose 1918*; Guerrero, rives du Rio Tecpan, *E. Langlassé 820 bis*; Oaxaca, Apongo and Pilas, *B. P. Reko 3463*.

Cryosophila warscewiczii (Wendl.) comb. nov.

Acanthorrhiza warscewiczii Wendl., in De Kerch., Les Palmiers, p. 230.

I have interpreted this species in the light of Bailey's full description and excellent illustration (*Gentes Herbarum*, vol. 3, 109-112, 1933). There are specimens in the National Herbarium from the Canal Zone (Panama) from which I have taken the vegetative characteristics for the key, but they are unfortunately sterile: *P. C. Standley 41113* and *L. A. Kenoyer 164*, Barro Colorado Island; Las Cascadas Plantation, beyond Summit, *W. R. Maxon* and *O. F. Cook 7102*. These established species, together with four newly proposed ones, may be distinguished as follows:

- Leaves glossy above, segments shortly bifid with falcately divergent tips;
 main axis of inflorescence bearing short simple branchlets
 fastigiate in a densely crowded interrupted spiral.....*C. cookii*
 Leaves not glossy above, tips of split segments parallel; inflorescence
 paniculiform.

- Leaves obliquely cross-veined (seen without lens!) between finer longitudinal veins above.
- Leaves thinly dull-white-tomentose to silvery beneath and costæ light brownish to rusty; fruits short-ovoid to globose, 17 mm. long or less.....*C. albida*
- Leaves silvery appressed-pubescent beneath; fruits elongate, pyriform, up to 25 mm. long.....*C. warszewiczii*
- Leaves only obscurely or not visibly cross-veined above between finer longitudinal veins.
- Spathes 15-20 cm. long; ligules produced to a triangular point....*C. argentea*
- Spathes 5-10 cm. long; ligules not markedly produced.....*C. nana*

Cryosophila cookii sp. nov. Arbor gracilis, caudice superne ca. 6 cm. diametiente, spinis rhizoideis pungentibus sparsim armato. Folia ex vaginis plus minusve elongatis extus albitomentosis intus glabris sursum in fibros sordidos indecore dissolutis; petiolis basi interdum longitudinaliter fissis, ramo florifero transfixis, deorsum fibris vaginalibus marginalibus tectis, 55 cm. longis, 2 cm. latis, intus convexis, extus semicylindricis primum tomentosis demum glabratis, apice 2.3 cm. latis, marginibus inermibus; ligula crassa dura triangula, et cum segmentis inferioribus connata ut in speciebus aliis; lamina 80 cm. longa, 135 cm. lata, profunde 7-fida, ca. 46-50-divisa, segmentis supra mediam partem liberis et apice breviter (ca. 8-15 mm.) bifidis (apicibus brevibus subfalcatis divergentibus), medio ca. 4 cm. latis, supra 1-costatis, utroque ad costam ca. 10-venosis, pallide viridibus, nitidis, oblique transverse venulosis, subtus argenteo-pubescentibus, non tessellatis sed venulas ca. 7 longitudinales propinquas inter venas adjacentes exhibitantibus. Spadix interdum petiolum fissum transfixens, nutans, ca. 45 cm. longus, basi spathis pleris late ovatis, ca. 21 cm. longis, 13 cm. latis, canaliculatis alternatis imbricatis albitomentosis, infima bicarinata, vestitus. Pedunculus 2.5 cm. crassus, dense albitomentosus. Ramuli floriferi simplices 4-6 cm. longi, fere glabri, densissime fastigiati, subspiraliter in axem dispositi. Flores 5.5 mm. longi, 3 mm. crassi, sepalis parte tertia vel fere dimidia connatis, lanceolatis, quam petalis brevioribus, glabris, margine irregulariter denticulatis vel præmorsis. Petala basi non connata substipitata vel valde angustata suborbiculata 4 mm. longa, 5 mm. lata, glabra, involuta, imbricata, media parte colorata, crassiuscula, margine hyalino irregulariter denticulata. Tubus stamineus angustus hyalinus membranaceus ad apicem versus gradatim angustatus, parte connata 2.5 mm. alta cum filamentis latis membranaceis 1 mm. longis continua, sinibus angustissimis. Antheræ anguste sagittatae breviter supra lobos basales dorsaliter affixæ, dorso et apice fusco-coloratæ, 2 mm. longæ, modo generis ex corolla clausa emergentes et radiatim deflexæ asterem formantes. Fructus ignoti. Specimen typicum legerunt O. F. Cook et C. B. Doyle in Costa Rica "no. 635, in forest, Rio Hondo, Plains of Santa Clara; alt. 100 m., 9 May, 1903, U. S. Nat. Herb. 474505-6-7.

This extremely well marked and interesting species was fortunately photographed when collected. Through the courtesy of Mr. Cook I am able to present the illustrations shown in Plates 10 to 12. On account of the curious spirally arranged dense fascicles of flower branchlets this species would seem to constitute a distinct subgenus. It is unknown except from the type locality.

Cryosophila albida sp. nov. Arbor gracilis caudice usque ad folia plus minusve spinis rhizoideris armato. Folia longe vaginata, vaginis extus sordide tomentosis (pilis albis et ferrugineis intermixtis), sursum incomplete et indecore in fibros dissolutis; petiolis juventute subtus appresse ferrugineo-furfuraceis, convexis, supra concavis viridibus, parte superiore 12-15 mm. lata; ligula subtriangula valde incrassata, lamina supra pallida, glabra, conspicue tessellata, venulis transversis obliquis, subtus tenuiter albido-tomentosa, (haud argentea), pilis albis et ferrugineis varie intermixtis, costis ferrugineis, medio vix ad ligulam fissa, utrinque minus profunde 4-5-fida; segmentis ca. 40, longissimis 110 cm. longis, medio solum 22 mm. latis, sursum gradatim angustatis, unicostatis, utroque ad costam ca. 13-venosis. Spadix nutans argens ca. 60 cm., ætate 90 cm. longus, basi ad caudicem versus spatha bicarinata 13 cm. longa apice bifida sustentus; spathis sequentibus cochleariformibus ca. 8 imbricatis extus albitomentosis, majoribus ca. 16 cm. longis. Pedunculus et rhachis subcarnosæ glabræ, bracteas breves pallidas membranaceas lineares vel triangulares basi abrupte dilatatas et lunulatas ferentes. Inflorescentia laxa ramosa, ramis inferioribus simpliciter ramulosis, superioribus simplicibus, dense florifera, floribus solitariis brevissime pedicellatis. Flores 5 mm. longi (antheris exclusis) 4 mm. latis. Calyx glaber parte tertia connatus, segmentis lanceolatis valde carnosus margine haud denticulatis sed integris, haud hyalinis. Petala quam sepalis longiora, intus ad receptaculum solidum adnata sed extus omnino libera carnosissima basi angustata subgibba apice rotunda, extus 4 mm. longa, intus 3 mm. longa, 3 mm. lata, imbricata. Filamenta 3 mm. longa, anguste deltoidea membranacea, ferrugineo-tincta sed hyalina, fere hucusque ad tertiam partem in tubum connata. Antheræ sagittatæ vix ex corolla exurgens, deflexæ ut in speciebus aliis, ad basin versus (quarta parte) dorsaliter affixæ, dorso prope apicem bifidum ferrugineo-tinctæ. Ovaria tria distincta subulata filamentis æquilonga. Fructus obovoidei vel subglobosi longitudine 14-17 mm., diametro 14 mm.—Costa Rica: legerunt O. F. Cook et C. B. Doyle, "no 74, plains of San Carlos, alt. 100 m., 14 Apr., 1903 (specimen typicum in U. S. Nat. Herb. sub num. 473820-21) et no. 74, 'palma de escoba'; Panama, H. Pittier, no. 5688, prope Boca de Pauarando, on Sambu River, southern Darien, alt. 20 m., Feb., 1912."

In the Panama specimen the globose fruits are exceedingly small, but since they do not seem to be fully developed it is probable that the material belongs here. I am greatly indebted to Mr. O. F. Cook for the photographs of the Costa Rican plant shown in Plates 6 to 9.

Cryosophila argentea sp. nov. Arbor gracilis usque ad 6 m. alta, caudice ca. 5 cm. diam. plus minusve spinis rhizoideis ramosis vel simplicibus pungentibus tecto, ætate interdum omnino denudato (ut in specimine typico). Folia flabellata ca. 44-costata medio fere ad petioli apicem fissa et utrinque profunde ca. 9-fissa, segmentis ultimis vel simplicibus 1-costatis, majoribus ca. 3 cm. latis, 70-85 cm. longis, vel compositis 2-4-costatis, 8 cm. latis; lamina supra sparsissime pilosa vel glabrata, inter costas propinquitur longitudinaliter venulosa solum sub lente obscure transverse venosa, subtus typice argentea pilis parallelis appressis plerumque albis sed ferrugineis intermixtis, costis ferrugineis; petiolis 70-120 cm. longis, subtus appresse ferrugineo-furfuraceis, convexis, supra viridibus, concavis, margine inermibus, basi 10 mm. apice 8 mm. latis; ligula triangula incrassata firma; vagina sordide lanosa, apice in fibros longos sordidos dissoluta. Spadix nutans interdum

petiolum fissum transfixens, ca. 60-70 cm. longus, basi spathis sordide albidis, tomentosis, mox glabratiss, striatis castaneisque, cochleariformibus, imbricatis, ca. 14-20 cm. longis tectus, pedunculo carnosissimo basi floccoso-lanato mox denudato; inflorescentia paniculiformi bracteolas parvas triangulas textura firmissculas ferente, laxè bis (terve) ramosa. Flores glabri 4.5 mm. longi, 3.2 mm. lati, basi retusi apice rotundata. Calycis segmenta carnosissima basi tertia parte connata, sursum sinubus angustis sed non angulatis separata, apice acuta, petalis vix æquilonga. Petala imbricata fere involuta 3 mm. longa et lata, ætate accrescentia ad 5 mm. latitudinem, libera, extus ad basin gibba, valde carnosissima, apice rotundata, margine tenuia et hyalina, minutissime denticulata, basi angustata. (Stamina et pistilla in floribus vetustis desunt.) Fructus in cupula 5 mm. diam, sedentes, maturitate flavidi vel albicantes, fere rotundi, ca. 12 mm. diametro, pericarpio papyraceo, semine pisiformi 8-10 mm. diametro; endocarpio molli; raphide inconspicua; endospermio solido, æquabili; embryo parvo in medio dorso sito.—Specimen typicum *H. H. Bartlett 11288* in Herb. Univ. Mich., ad "Cornhouse Creek, Manatee River, Belize District, British Honduras." Distributio: Mexico, Campeche, Hacienda San Pablo, prope Champoton, *G. N. Collins 38* et *70* sub nom. vernac. "palma de escoba"; British Honduras, Corozal District, *Percy H. Gentle 630*, sub nom. vernac. "give-and-take"; Guatemala, Peten, Santa Teresa, Subin River, *C. L. Lundell 2669*, sub nom. vernac. "escoba" (Sp.) et "akuum" (Maya); Peten, La Libertad, *C. L. Lundell 2887*; Alta Vera Paz, Finca Sepacuite, *O. F. Cook & R. F. Griggs 77*.

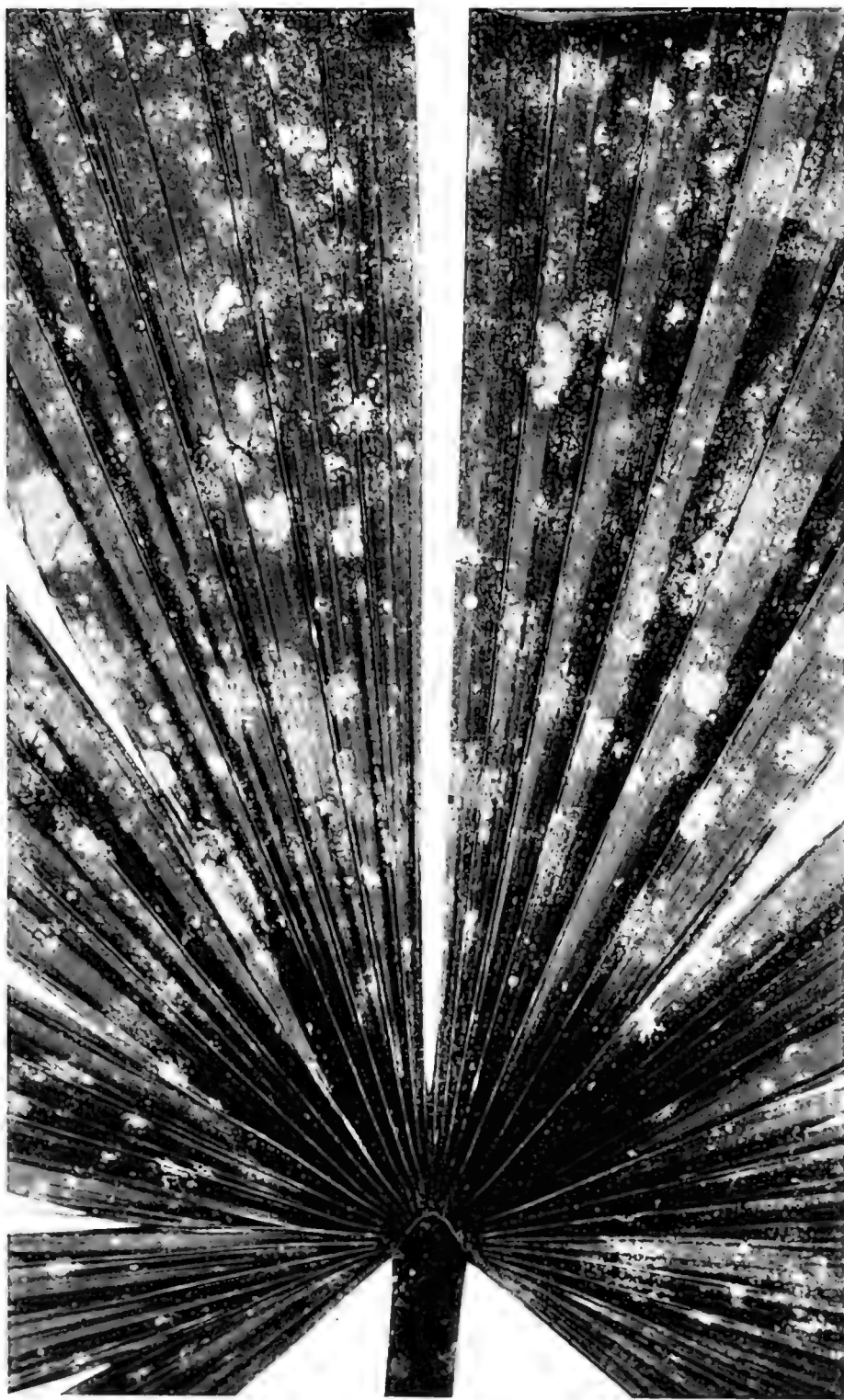
Photographs of this species, taken by Mr. O. F. Cook, are shown in Plates 2 to 5.



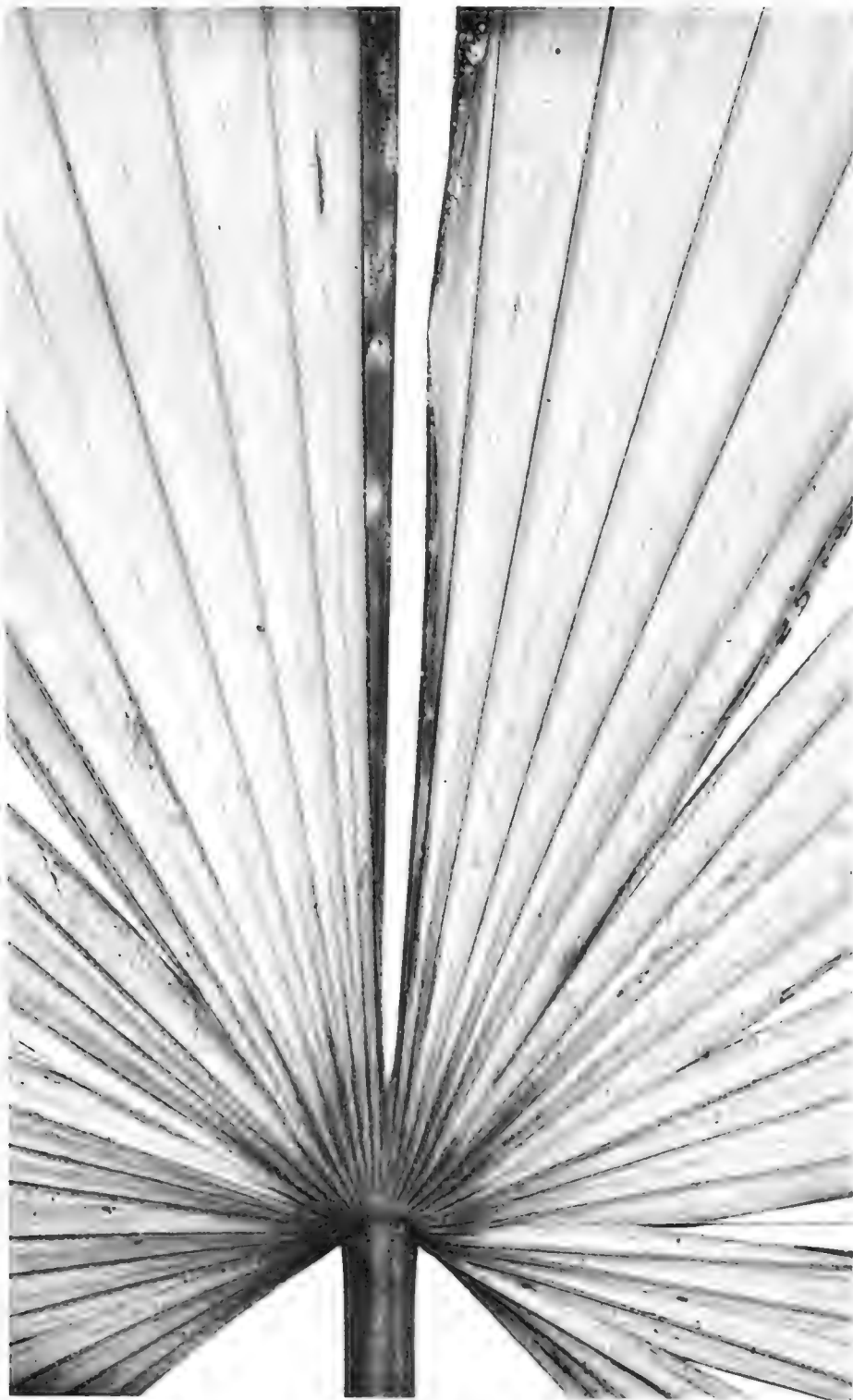
Acaoraphe pincetorum Bartlett. Dense islet of *pimenta* palms (*pimenta*) in Cornhouse Creek Pine Ridge, Manatee River, British Honduras. For other views of habitat of this palm see preceding paper in this volume, Plates 1 and 2.



Cryosophila argentea Bartlett. Photographed in Peten by O. F. Cook. Note dense investiture of trunk with intricate mass of spine-like branched aerial roots. It is from this characteristic that the palm gets its vernacular name "give-and-take." There can be no doubt that the somewhat obscure Latin description of *Corypha nana* H.B.K. has reference to this dense sheath of roots, and that *Cryosophila* is therefore the same as *Acanthorrhiza*.



Cryosophila argentea Bartlett. Upper surface of leaf showing ligule. Note epiphytic lichens and liverworts which generally cover older leaves. Photographed in Peten by O. F. Cook.



Cryosophila argentea Bartlett. Lower surface of leaf. Photographed by O. F. Cook, in Peten.



Cryosophila argentea Bartlett. Portion of inflorescence showing globose or subglobose fruits. Contrast with Bailey's illustration of *Cryosophila warscewiczii* (Wendl.) Bartlett (*Acanthorriza warscewiczii* Wendl.) figure 88 in his article "Certain Palms of Panama" (*Gentes Herbarum*, vol. 3, 31-116, 1933). Photographed by O. F. Cook.



Cryosophila albida Bartlett. Crown and inflorescences. Photographed by O. F. Cook, San Carlos, Costa Rica, April 1903.



Cryosophila albida Bartlett. Leaf base and portion of inflorescence in late anthesis. Most of flowers have dropped. (Contrast with Plate 8, showing an immature inflorescence with anthers not yet extruded.) Photographed by O. F. Cook, San Carlos, Costa Rica, April 1903.



Cryosophila albida Bartlett. Slightly immature inflorescence, showing densely crowded flowers with anthers not yet extruded and deflexed to form six-rayed star that characterizes genus. Photographed at San Carlos, Costa Rica, by O. F. Cook, April 1903.



Cryosophila albida Bartlett. Mature fruit. Photographed by O. F. Cook at San Carlos, Costa Rica, April 1903.



Cryosophila cookii Bartlett. Leaf and inflorescence of type, collected and photographed by O. F. Cook, Plains of Santa Clara, Rio Hondo, Costa Rica, May 1903. (*Cook and Doyle* 635).



Cryosophila cookii Bartlett. Inflorescence, showing characteristic spiral or densely
distichate flowering branchlets. Same as specimen shown in Plate 10, photographed by
O. F. Cook, May 1903.



Cryosophila cookii Bartlett. Leaf base, showing ligule; portions cut from spiral of fastigate flowering branchlets, showing that the latter are connate at base; split petiole transfixed by the spadix. Same specimen as in Plates 10 and 11, photographed by O. F. Cook, May 1903.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

III

**SCHEELEA LUNDELLII, A NEW "COROZO" PALM
FROM THE DEPARTMENT OF PETEN, GUATEMALA**

BY HARLEY HARRIS BARTLETT

With five plates

[Issued July 10, 1935]

SCHEELEA LUNDELLII, A NEW "COROZO" PALM FROM THE DEPARTMENT OF PETEN, GUATEMALA ¹

During the 1933 biological expedition of the Carnegie Institution of Washington and the University of Michigan, Mr. C. L. Lundell was so fortunate as to discriminate and collect in the Department of Peten, Guatemala, the second of the gigantic palms known there as "corozo." The most frequent "corozo" of British Honduras and the Petén district has long been known as *Attalea cohune* Mart., but it has only recently been found to be no *Attalea* at all but rather an *Orbignya*, which is now known as *O. cohune* (Mart.) Dahlgren. *Attalea cohune* had been supposed to be a species of wide distribution in Central America, but Bailey ² in 1931 made the surprising discovery that the *corozo* of the Panama Canal Zone was neither *Attalea* nor *Orbignya*, but a new *Scheelea* which he made *Scheelea zonensis*. In the Peten in 1931 the writer had heard native reports that the *corozo* palms were of two very distinct kinds, but found no opportunity to follow up the clue. Mr. Lundell, however, was more enterprising, and collected excellent material of both *corozos*, one of which proves to be *Orbignya cohune* (Mart.) Dahlgren, the other being still another undescribed *Scheelea*, which it is an especial pleasure to name in honor of the collector. I am indebted to Mr. Lundell for careful notes on the new species, which are incorporated in the description.

In deciding that *Scheelea lundellii* is indeed new, I have been somewhat hampered by lack of access to material of the previously described Mexican and Central American species. I have relied upon Bailey's criterion for separating his *S. zonensis* from *S. liebmannii* Becc. of Mexico and *S. preussii* Burr. of Guatemala, the distinction being that the fruits of the two latter species are only half as big as those of the former. In size of fruit *S. lundellii* is indeed similar to *S. zonensis*, but it differs markedly in the relative length of the sepals and petals of the accrescent fruiting perianth. Bailey also contrasts *S. brachyclada* Burr. of Peru with *S. zonensis*, but the Peruvian species appears to be quite distinct from *S. lundellii* in its much smaller staminate flowers, although it is similar in the relative lengths of sepals and petals. The published descriptions are not sufficiently uniform so that these large palms can be contrasted with regard to all of the characteristics that are believed to be the especially significant ones for distinguishing *S. lundellii* from some one or more of the allied species. These characteristics are (1) the long flexuous spine-like appendages of the inner edges of the petioles (shown in Plate 1; distinction from *S. zonensis* Bailey and possibly from the other species),

¹ Papers from the Department of Botany and the Herbarium of the University of Michigan, No. 525.

² L. H. Bailey, *Certain palms of Panama*, Gentes Herbarum, vol. 3, 31-116, 1933.

(2) the interrupted arrangement of the leaflets (distinction from *S. zonensis*), (3) the dark, red-brown, close, resinous, subreticulate indument of the lower surface of the petiole, rhachis, leaflet margins, flowering spathe, and peduncle, (4) the paired arrangement of the staminate flowers (distinction from *S. zonensis*), (5) the large size of the staminate flowers, which average 16 mm. in length (distinction from *S. brachyclada* Burr.), (6) the great length of the fruiting perianth, which is 3 to 3.5 cm. long (presumed distinction from the three other Mexican and Central American species), (7) the petals of the fruiting perianth being longer than the sepals (distinction from *S. zonensis*), and (8) the large size of the fruit, which is 6.3 to 6.6 cm. long (distinction from *S. liebmanni* Becc. and *S. preussii* Burr.).

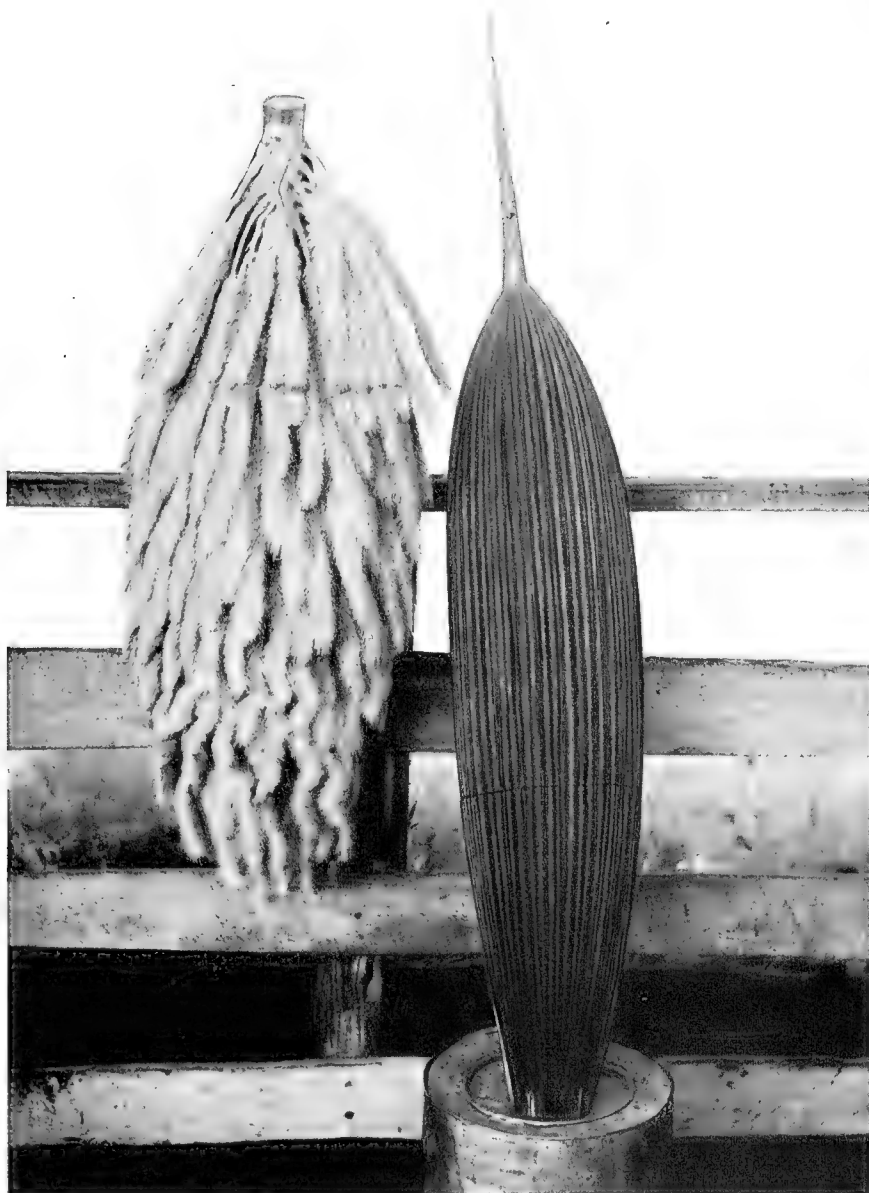
Scheelea lundellii is known in Maya as *kantutz*. It so closely resembles the other *corozo*, *Orbignya cohune*, in size and general appearance that there is little reason to wonder at both species having the same Spanish name. They grow together at Polol, Peten, in deep clay soil, characterizing and giving name to the plant association known as the *corozal*. *Scheelea lundellii* was also observed (but not collected) on the banks of the Subin River, and according to local report it occurs commonly along the banks of the Rio Pasion and its tributaries. These localities are all in the Department of Peten.

Scheelea lundellii sp. nov.—Arbor procera imperialis maturitate 20-metralis caudice deorsum denudato sursum petiolis vetustis et spathis spadicebusque vel juvenilibus vel vetustioribus pendentibus obtecto. Folia plus minusve isophylla, maxima 8 m. longa, infima fere horizontalia, media arcuate ascendenti-patentia, suprema novella fere verticalia. Petiolus quadrangulus, basi expansus, aciebus interioribus appendices spiniformes flexuosas 35 cm. longas duras, exterioribus pannosos fibros dilaceratos fulvos ferentibus. Rhachis quadrangula, aciebus acutis, crassa, supra concava, nitida, glabra, viridiuscula, subtus convexa, densissime et appresse indumento resinoso rufo-ferrugineo induta, lateraliter inter foliola glabra, viridiuscula. Foliola numerosa rigida integerrima, utrinque ca. 10-venulosa, prominule tessellata, valde unicostata, venulis horizontalibus propinquis, infima 90-120 cm. longa, 1.4-2.8 cm. lata, media 120-125 cm. longa, 6-6.5 cm. lata, superiora inter se distincta (haud ut sunt terminalia confluentia) 45-60 cm. longa, 2-3 cm. lata, terminalia lateribus connata, basi ad insertionem acute plicata, canaliculo ad paginam inferiorem versus aperto, sursum plana, apice acuminata, margine (praecipue subtus in foliolis inferioribus) ut in rhachide atroferruginea, indumento resinoso punctato tenui compacto; foliolorum dispositio interrupta, intervallis imparibus irregularibus plerumque 3-5 cm. interdum 12 cm. extentis. Spathae floriferae lignae pars inflata nondum expansa fusiformis 90 cm. longa, 25 cm. crassa, ochracea, multum profunde canaliculata, canaliculis glanduloso-punctatis et pallide ferrugineis, indumento resinoso compacto, apice attentuata in appendicem tenuem compressam 45 cm. longam gladiiformem producta,

basi ad spadiceis crassitudinem angustata. Spatha inferior 80 cm. longa, basi dura, fulva, applanata, sursum in fibros dissoluta. Pedunculus indumento ferrugineo-furfuraceo vestitus, in rhachidem paene glabram 2.8 cm. crassam transiens. Inflorescentia simpliciter denseque ramosa, ramis 25-35 cm. longis, 2-4 mm. crassis, bractea late triangula, acuta, 3-4 mm. longa subtentis, tertia parte basali non floriferis, false albopubescentibus, pilis falsis verum raphidibus fasciculatis utrinque acutis omnibus aequilongis ex cellulis secretoriis ejectis, sursum dense floriferis et dense fasciculatim albivestitis; floribus stamineis binis a bracteolis 3 persistentibus triangulis crassiusculis subtentis. Flores staminei 16-18 mm. longi, pallide ochracei; calycis segmentis 3 triangulis, basi paulum imbricatis 1.5 mm. longis, ovatis, apice in acumen attenuatis, carinatis; petalis plerumque 15-18 mm. longis, teretibus vel paululum compressis, clavatis; staminibus 6; filamentis 2.5-3 mm. longis, gracilibus, sursum attenuatis; antheris 3.5-4 mm. longis, lutescentibus, tertia parte ex basi affixis. Pistillodium indivisum parvum tenue. Fructus elliptici apice rostrati, 6.3-6.6 cm. longi, 2.8-3.4 cm. crassi, striatulati, siccitate atrobrunnei; exocarpio sicco fibroso; endocarpio osseo, 4.8 cm. longo, 2.5 cm. crasso. Perianthium accrescens aetate 3-3.5 cm. longum; receptaculo communi basali poculiformi 6 mm. alto; sepalis ovatis imbricatis deorsum obtuse, sursum alte acuteque carinatis, apice acutis; petalis imbricatis, late ovatis, quam sepalis 5 mm. longioribus. —Specimen typicum legit C. L. Lundell, no 3752, prope Polol, Peten, Guatemala, 11 June 1933, in Herb. Univ. Mich. conservatum. A speciebus affinibus *S. liebmannii* Becc. et *S. preussii* Burr. differt fructibus duplo majoribus; a *S. zonensis* differt petalis florum accrescentium multum longioribus quam sepalis; a *S. brachyclada* Burr. differt floribus stamineis valde majoribus.



Scheelea lundellii Bartlett. Base of petiole, showing long flexuous spine-like appendages of inner edges and ragged fibrous outer edges.



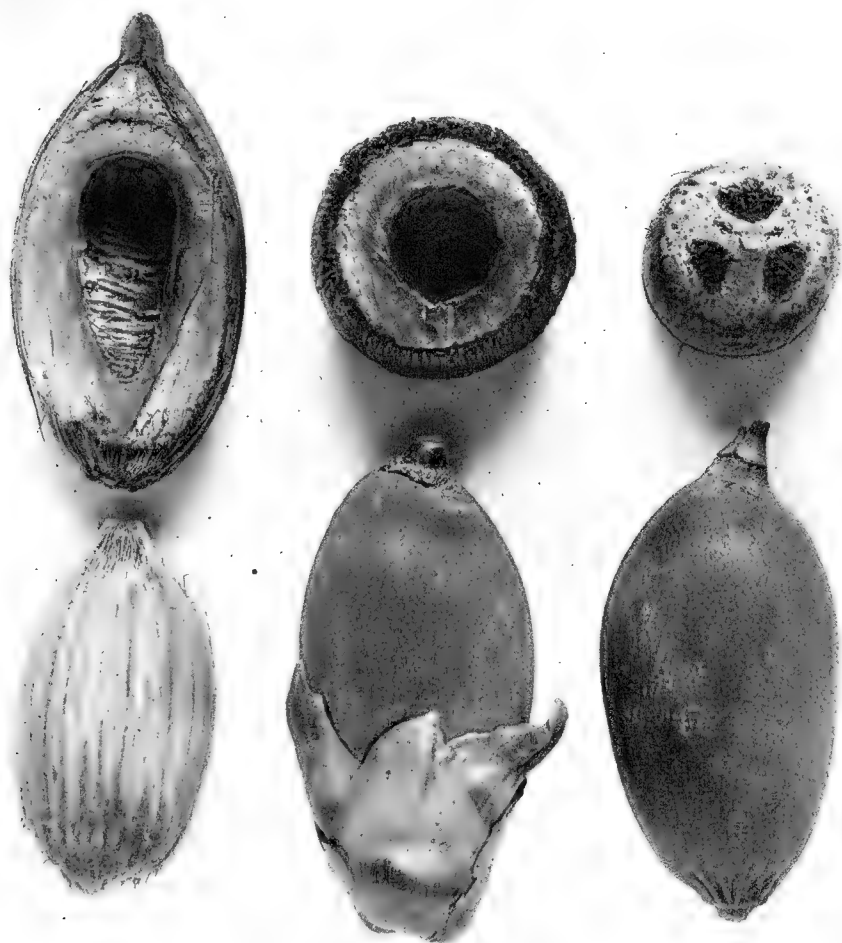
Scheelea lundellii Bartlett. Floriferous spathe before anthesis, showing the as yet undehiscent fusiform hollow portion and bayonet-like terminal appendage. Spadix is shown on left.



Scheelea lundellii Bartlett. Apical portion of spadix, showing simple branching and flowering branchlets naked at base but crowded with paired staminate flowers above.



Scheelea lundellii Bartlett. Lower (sterile) apathe, showing ragged, fibrous, terminal portion (two-thirds) and hard, leathery, basal third.



Scheelea lundellii Bartlett. Fruits, natural size. Note accrescent fruiting perianth, showing petals distinctly longer than sepals. All perianth parts are connate to a cup-like common receptacle.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

IV

NEW PLANTS FROM THE YUCATAN PENINSULA

BY PAUL C. STANDLEY
Field Museum of Natural History

[Issued November 26, 1935.]

NEW PLANTS FROM THE YUCATAN PENINSULA

Until about six years ago, the Yucatan Peninsula was one of the regions of North America least known botanically. Indeed, even at the present time there is little published information regarding most of the area, the principal papers treating it being the writer's *Flora of Yucatan*,¹ which deals primarily with plants of the extreme northern part of the Peninsula, a paper by C. L. Lundell entitled *Preliminary sketch of the phytogeography of the Yucatan Peninsula*,² and a brief list, covering only a few families, of the plants of British Honduras.³ Concerning the floras of Campeche, Quintana Roo, the Department of Peten in Guatemala, and British Honduras practically nothing was known until very recently.

During the past five years a great deal of botanical collecting has been done in British Honduras and Peten, and some in Campeche. While it can not be considered that their floras even now are known at all completely, since every new collection includes many additions to the previously recorded flora, and even new species, it is nevertheless possible at present to form some definite idea of the general nature of plant life in these regions.

While recent collections from the Yucatan Peninsula have come from various sources and have been made by a rather large number of visiting or resident collectors, there are two principal sources of them.

Most important in extent are the collections obtained by the University of Michigan in cooperation with the Carnegie Institution of Washington. The first botanical survey under these auspices was undertaken in the winter of 1930-31, to British Honduras and adjacent Peten. Some of the new species obtained at that time by Professor H. H. Bartlett already have been published by the writer.⁴ A large collection was made by W. C. Steere and Jason R. Swallen on the second expedition undertaken in 1932 in the northern part of the Peninsula. The greatest number of specimens was collected by C. L. Lundell in 1933 during his work in Peten and British Honduras, a continuation of his previous extensive field work in 1932 in the State of Campeche. Several resident collectors have obtained further material for the University of Michigan, particularly Percy H. Gentle, Mercedes Chanek and Mercedes Aguilar. Practically all the plants obtained in Peten and Campeche have constituted new records for those geographic areas, and a very large proportion of the British Honduras plants likewise have represented species new to the listed flora of that colony.

¹ Field Mus. Pub. Bot., vol. 3, No. 3, 1930.

² Carnegie Inst. Wash. Pub. No. 436, 253-355, 1934.

³ T. A. Sprague and L. A. M. Riley, *Materials for a flora of British Honduras: I*, Kew, Bull. 1924, 1-20, 1924.

⁴ Paul C. Standley, *New plants from British Honduras*, Field Mus. Bot., vol. 11, 129-142, 1932.

The many hundreds of plants obtained in British Honduras by William A. Schipp have yielded a surprisingly high percentage of new species, many of which already have been described by the writer, and many others figure in the present paper. Mr. Schipp's explorations have been confined to the central and southern parts of British Honduras, whose flora is much more varied and luxuriant than that of northern British Honduras and Peten, and on that account it was to be expected that the number of new species discovered would be greater than in the latter area. Particularly rich in this respect are his most recent collections from the region of the Cockscomb Mountains, along the boundary between British Honduras and Guatemala.

The amount of information regarding the vegetation of the Yucatan Peninsula supplied by these ample collections is very great indeed, and it is to be hoped that all of it may be placed upon record in the near future. The assembled collections prove that the floras of Yucatan, Campeche, Peten (as far as explored up to the present time), and northern British Honduras are in general uniform, with natural local modifications. The flora of southern British Honduras, particularly that of the hills and mountains, is decidedly different, as the differences in climate would lead one to expect. It is essentially like that of the rain forests of adjacent Guatemala, and shows affinities with the flora of the mountains of central Honduras.

The recent collections have emphasized the occurrence in the Yucatan Peninsula of West Indian species, particularly plants of Cuba and Jamaica, unknown elsewhere on the mainland. Several such species are mentioned on the following pages.

The writer has mentioned previously the curious occurrence in British Honduras of certain trees or other plants representing species or genera known otherwise only in the Guianas or Brazil and nowhere in the intervening regions, although there is, naturally, the possibility or probability that they may be found later in other parts of the Central American coast. The fact remains that up to the present they have not been found there, despite the rather intensive exploration to which much of that coast has been subjected. On the following pages there are mentioned as examples of such erratic distribution *Chamissoa macrocarpa*, *Tipuana lundellii*, *Bredemeyera lucida*, *Davilla aspera*, *Hybanthus ipecacuanha*, *Jussiaea nervosa*, *Oocarpon torulosum* and *Cuspidaria pterocarpa*.

It is sincerely to be hoped that the intensive exploration conducted so successfully during recent years in the Yucatan region may be continued. In spite of its extent, it is certain that further work will vastly increase the list of plants now known from the area. It is especially to be desired, also, that further attention may be directed to such groups as the Sapotaceæ, a family of great economic importance, whose center of distribution in North America is clearly in this geographic region, where grows the tree of the family that is of greatest commercial importance of all Sapotaceæ.

ALISMATACEÆ

Echinodorus nymphæifolius (Griseb.) Buchenau, Bot. Jahrb., 2, 483. 1882. *Alisma nymphæifolium* Griseb. Cat. Pl. Cub. 218. 1866—This well-marked species was described from western Cuba, and has been recorded only from that island. It has been collected recently on the mainland, in the Yucatan Peninsula, a region where it might be expected to occur. Mexico: Tuxpeña, Campeche, January 30, 1932, *C. L. Lundell* 1270.

CYPERACEÆ

Rynchospora divergens Curtis, Amer. Jour. Sci., ser. II, vol. 7, 409, 1849—The species is frequent in Florida and occurs also in Cuba, but it has not been known heretofore from Central America or, so far as the writer knows, from anywhere else on the continent. The following collection, therefore, represents a substantial extension of range. British Honduras: Honey Camp, at edge of water in pine ridge, August 1930, *William C. Meyer* 106.

Rynchospora hirsuta Vahl—In a recent account of the Cyperaceæ of Central America (Field Mus. Bot., vol. 8, 277, 1931) this species was reported in the region treated only from Panama. A later collection proves that the plant ranges much farther northward. British Honduras: All Pines, open places, common, January 1931, *W. A. Schipp* 676.

Scleria gracilis Ell., Bot. S. C. & Ga., vol. 2, 557, 1816—The species is native in the southeastern United States and in Cuba, but it has not been reported from continental tropical America. The following collection shows it to be a member of the Central American flora. British Honduras: Honey Camp, in sandy soil, edge of water hole in pine ridge, August 1930, *William C. Meyer* 107.

FAGACEÆ

Quercus schippii sp. nov.—Arbor 30-metralis, trunco 1 m. diam., ramulis novellis densissime pilis brevibus mollibus brunneis velutino-pilosis; folia magna breviter petiolata subcoriacea, petiolo crasso 2-2.5 cm. longo dense velutino-piloso; lamina elliptica vel oblongo-elliptica 19-25 cm. longa 7-11 cm. lata acuta, basi plus minusve inæquali rotundata vel obtusissima, marginibus ubique leviter undulato-crenatis, supra lucida tantum ad nervos pilosula, costa vix elevata, nervis prominulis, nervulis planis, subtus fere concolor ad costam nervosque tomentosa, aliter glabra vel glabrata, costa gracili prominente, nervis lateralibus utroque latere circa 20 fere rectis angulo semirecto adscendentibus paullo ante marginem anastomosantibus; fructus (in statu juvenili tantum visus) sessilis, cupula 8 mm. lata, squamis oblongo-linearibus attenuatis arcte imbricatis tomentosis. British Honduras: In forest, Camp 36, British Honduras-Guatemala boundary, alt. 840 m., June 23, 1934, *William A. Schipp* 1248 (Herb. Field Mus. No. 733, 679, type).

Because of the incomplete nature of the available material, the systematic position of this tree is uncertain, but the material is scarcely referable to any of the species of Central America and southern Mexico so well described and illustrated by Trelease in his monograph of the American oaks.

ULMACEÆ

Celtis trinervia Lam.—An apparently frequent shrub or small tree of the Greater Antilles, but not recorded for the continent. The following collections from Guatemala are the first record of the species for Central America. Uaxactun, Peten, a small tree, April 1931, *H. H. Bartlett* 12574. Topoxte ruins, Peten, June 1933, *C. L. Lundell* 4306.

Trema floridana Britton ex Small, Fl. Southeast. U. S. 366, 1329, 1903. This fairly distinct species of *Trema* was described from southern Florida, where it appears to be common. A recent investigation by the writer of the Tremas occurring in Mexico and Central America shows that the Yucatan material of the genus should be referred to *T. floridana*, which differs from the wide-spread and exceedingly variable *T. micrantha* (L.) Blume chiefly in its rather deeply cordate leaves and short compact inflorescence. The following specimens have been examined.

Yucatan: Kancabtsonot, common in brush lands, *Gaumer* 23530; a shrub of 5 meters, blooming in January. Without locality, *Gaumer* 24386, 24068, 24009. San Anselmo, *Gaumer* 1414; a shrub of 2.5 meters. Izamal, in 1888, *Gaumer*. Pocoboch, *Gaumer* 2385. Buena Vista Zbac, *Gaumer* 1112.

I have seen no other Mexican material referable to this species, which therefore is interesting as another instance of a species confined, on the mainland, to the Yucatan Peninsula.

MORACEÆ

Ficus lundellii sp. nov.—Ramuli crassi rimosi minutissime puberuli vel fere glabri, internodiis brevibus; stipulæ caducæ angustæ sensim attenuatæ 1.5-2.5 cm. longæ minute puberulæ; folia petiolata mediocria vel parva coriacea, petiolo crassiusculo 5-17 mm. longo; lamina elliptico-oblonga medio latissima 4.5-9 cm. longa 2-4.5 cm. lata, apice obtusissima vel interdum rotundata basi obtusa glabra integra, supra dense minute nigropuncticulata, nervis non elevatis, subtus paulo pallidior puncticulata, costa gracili prominente, nervis lateralibus utroque latere circa 8 angulo semirecto adscendentibus fere rectis prope marginem arcuato-conjunctis, nervulis conspicuis arcte reticulatis; receptacula geminata sessilia 7-8 mm. diam. minutissime puberula vel fere glabra ut videtur viridia maculis atropurpureis conspersa, apice bracteolis elevatis ostioli umbonata; involucrem paullo asymmetricum glabrum profunde bilobum receptaculo duplo brevius. Guatemala: La Libertad, Department of Peten, May 26, 1933, *C. L. Lundell* 3406 (Herb. Field Mus., type). La Libertad, April to June 1933, *Lundell* 3249, 3655, 2292. Sabana San Francisco, La Libertad, *Lundell* 2464. La Libertad, *Mercedes Aguilar* 210.

Probably a close relative of *F. tuerckheimii* Standl., of Guatemala and other regions of Central America, which is distinguished by its larger leaves and stipules and the plane ostiole of the fruit.

Piratinera panamensis Pittier.—Hitherto the genus *Piratinera* has been known in North America only from Panama. Two collections (Nos. 1094 and 1246) made in British Honduras at Nazareth, Toledo District, and along the Guatemalan boundary, by William A. Schipp in 1932 and 1934 were distributed as a new species of *Piratinera*, upon the basis of the writer's

determinations. More careful study of the material shows that it is easily referable to *P. panamensis*, whose range, consequently, is extended substantially. Mr. Schipp describes the species as a tree of 9 to 10 meters, with trunk diameter of 15 cm., growing in pastures or forest at an elevation of 60 to 650 meters.

LORANTHACEÆ

Phthirusa phaneroloma sp. nov.—Frutex parasiticus ramosus 35 cm. altus et ultra, ramis vetustioribus teretibus dense lenticellatis viridibus vel olivaceis glabris, junioribus densissime ferrugineo-furfuraceis, internodiis foliis brevioribus; folia parva breviter petiolata in sicco rigida et læte viridia, petiolo crassiusculo 2-4 mm. longo anguste marginato furfuraceo; lamina elliptica vel oblongo-elliptica 2-4 cm. longa 1.3-2.2 cm. lata apice obtusa vel anguste rotundata basi obtusa vel subacuta, supra glabra nervis venulisque prominulis, subtus concolor, ad costam prominentem primo dense furfuracea serius glabrata, basi obscure quintuplinervia, nervis tenerrimis vix prominulis, marginibus con picuis dense ferrugineo-furfuraceis; inflorescentiæ axillares 3-5-floræ petiolis vix longiores breviter pedunculatæ glabræ, floribus sessilibus, bracteis et prophyllis in cupulam dentatam coalitis, calycodio a cupula bractearum abscondito; baccæ oblongo-cylindraceæ 5 mm. longæ glabræ apice subtruncatæ. British Honduras: Sibun River, December 5, 1934, *Percy H. Gentle* 1426 (Herb. Field Mus. No. 757, 696, type).

Referable to the genus *Dendropemon*, as treated by Urban, and, so far as I know, the first member of that group to be recorded from continental tropical North America. The plant is easy to recognize because of the conspicuous brown margins of the leaves. It is related to *P. emarginata* (Swartz) Eichl. of the West Indies.

AMARANTHACEÆ

Chamissoa macrocarpa HBK.—Two species of *Chamissoa* have been known heretofore from North America, the wide-spread *C. altissima* (Jacq.) HBK., of general distribution in tropical America, and *C. maximiliani* Mart., a South American species extending northward to Panama and Costa Rica, where it is of rare occurrence. A third species may now be reported, *C. macrocarpa*, which has a wide distribution in South America. Jones Bank, Belize River, British Honduras, March 17, 1933, *C. L. Lundell* 4223.

MENISPERMACEÆ

Disciphania coriacea sp. nov.—Scandens usque ad 18 m. longa, trunco 2.5 cm. diam., glabra, caulibus gracilibus costato-striatis, internodiis elongatis; folia longe petiolata firme coriacea, petiolo 6.5 cm. longo, lamina pel-tata, petiolo 3 cm. supra basin inserto, oblonga vel ovato-oblonga circa 12 cm. longa et 5 cm. lata breviter obtuse acuminata basi late rotundata et circa 10-nervia, lucida, in sicco plus minusve fusca, nervis supra non elevatis, subtus concolore, costa gracili elevata, subtrinervia, nervis ut nervulis arcte reticulatis prominentibus; flores racemosi subsessiles, racemis in statu fructifero 11 cm. longis gracilibus flexuosis; fructus luteus 1.8 cm. longus et ultra glaber basi et apice rotundatus, endocarpio compresso rotundato-elliptico 1.5 cm. longo, utrinque dorso longitrorsum tricostato. British Hon-

duras: Rio Grande, in forest, alt. 35 m., January 11, 1933, *William A. Schipp* S458 (Herb. Field Mus. No. 669, 147, type).

Described by the collector as "very rare." Closely related to *D. calocarpa* Standl., of the Atlantic coast of Honduras, and perhaps only a form of that species, which differs, however, in its almost membranaceous leaves, which are much broader in outline. The sides of the leaves of *D. coriacea* are almost parallel and straight, while in *D. calocarpa* they are strongly curved.

LAURACEÆ

Ocotea campechiana sp. nov.—Arbor 15-metralis, trunco 35 cm. diam., ramis subteretibus brunneis rimosis, novellis densissime minute albido-sericeis, internodiis brevibus; folia parva breviter petiolata coriacea, petiolo crassiusculo 4-8 mm. longo minute sericeo; lamina anguste oblongo-lanceolata vel lineari-lanceolata 4-11 cm. longa 0.8-3 cm. lata longissime attenuata, apice ipso obtuso, basi acuta, supra in sicco griseo-viridis opaca glabrata, nervis venisque planis vel subimpressis, subtus fere concolor dense minutissime sericea, costa gracili elevata, nervis lateralibus obscuris vel obsoletis, nervulis obsoletis; flores parvi subumbellato-paniculati, paniculis parvis angustis laxe paucifloris 1-2 cm. longis 1.5-2.5 cm. longe pedunculatis, ramis brevibus rigidis minute sericeis, pedicellis crassiusculis 1-2 mm. longis; alabastra obovoideo-globosa 2-2.5 mm. longa sparse minute sericea vel fere omnino glabra, sepalis alte connatis apice tantum liberis. Campeche: Tuxpeña, February 6, 1932, *C. L. Lundell* 1295 (Herb. Field Mus. No. 655, 197, type). Guatemala: La Libertad, Department of Peten, in 1933, *Lundell* 3065, 3359, 3409. British Honduras: Indian Church, New River Lagoon, in forest, September 1928, *C. S. Brown* 31.

All the specimens cited are exceptionally uniform in size and shape of leaves and in their other characters. Among all the Lauraceæ of northern Central America, this tree is easily recognized by the very narrow, somewhat coriaceous leaves, minutely sericeous on the lower surface, and somewhat coriaceous in texture.

Ocotea lundellii sp. nov.—Rami teretes lucidi grisei minute lenticellati, internodiis brevibus vel elongatis, glabri; folia mediocria petiolata coriacea, petiolo crassiusculo 7-14 mm. longo glabro; lamina lanceolato-oblonga 9-11.5 cm. longa 3.5-4.5 cm. lata breviter acuminata, acumine attenuato obtuso, basi acuta, glabra, supra cinereo-viridis lucida, costa plana, venulis prominulis arcte reticulatis, subtus fere concolor, costa gracili prominente, nervis lateralibus utroque latere circa 6 angulo acuto adscendentibus teneris irregularibus, nervulis vix elevatis reticulatis; inflorescentiæ axillares cymoso-paniculatæ 3-6 cm. longæ laxè paucifloræ foliis multo breviores, ramis pallidis gracilibus glabris, pedicellis gracilibus pallidis usque ad 7 mm. longis glabris; flores 4.5-5 mm. longi basi acuti, sepalis lanceolato-oblongis 3 mm. longis obtusis, exterioribus extus sparse sericeis intus papilloso-villosulis, interioribus utrinque præsertim ad margines dense papilloso-villosulis. Guatemala: Ixlu ruins, Lake Peten, Department of Peten, June 15, 1933, *C. L. Lundell* 4359 (Herb. Field Mus. No. 752, 014, type). British Honduras: Maskall, April 1934, *Gentle* 1206, 1216.

In general appearance as well as in structural details this is very similar to *O. catesbiana* (Michx.) Sarg., of southern Florida, to which evidently it is closely related.

CAPPARIDACEÆ

Capparis lundellii sp. nov.—Rami crassi angulati, novellis interdum complanatis dense argenteo-lepidotis; folia breviter petiolata coriacea, petiolo crasso 5-9 mm. longo; lamina cuneato-obvata 7.5-12 cm. longa 3.5-5 cm. lata abrupte acute acuminata, basin versus sensim cuneato-angustata, basi ipsa anguste rotundata, supra luteo-viridis glabra, costa impressa nervis nervulisque prominulis arcte reticulatis, subtus paullo pallidior dense minute albido-lepidota, serius glabrata et ubique punctata, costa crassiuscula elevata, nervis lateralibus utroque latere circa 10 angulo semirecto adscendentibus tenerrimis prominulis, nervulis laxe reticulatis; inflorescentia cymoso-paniculata 5-6 cm. lata dense multiflora 4-5 cm. longe pedunculata, ramis complanatis dense lepidotis, pedicellis subumbellatis 6-8 mm. longis rectis; calyx disciformis in alabastro apertus fere 3 mm. latus, dentibus triangularibus brevibus acutis subreflexis extus lepidotis; petala obovata 8-10 mm. longa 4-5 mm. lata apice rotundata extus dense stellato-tomentosa et ut videtur basi glandula magna orbiculari glabra onusta; stamina numerosa, filamentis 2.5 cm. longis et ultra glabris, antheris lineari-oblongis 3 mm. longis. Guatemala: San Andres, Department of Peten, May 3, 1933, C. L. Lundell 3115 (Herb. Field Mus. No. 706,401, type). Also No. 3201 of the same collector, obtained at the same time and place.

Capparis lundellii is associable with *C. indica* (L.) Fawc. & Rendle, a common species of the Yucatan Peninsula, but that differs conspicuously in its brownish indument, smaller, narrower, not acuminate leaves, narrow erect sepals, and various other minor characters.

ROSACEÆ

Photinia microcarpa sp. nov.—Arbor 15-metralis, trunco 25-45 cm. diam., ut videtur dense ramosa, ramulis gracilibus rubro-brunneis lucidis, novellis tomento denso ferrugineo obtectis; stipulæ subulatæ minutæ caduæ; folia parva breviter petiolata firme coriacea, petiolo 7-12 mm. longo ad medium anguste marginato tomentoso vel glabrato; lamina anguste oblanceolato-oblonga vel oblonga 4.5-9.5 cm. longa 1.5-3 cm. lata acuta vel obtusa, basin attenuatam versus sensim angustata, integra vel versus apicem remote crenato-serrata, supra glabra in sicco fusco-viridis, nervis non elevatis, nervulis vix prominulis arcte reticulatis, subtus pallidior brunnescens glabrata, costa gracili elevata, nervis lateralibus utroque latere circa 13 prominentibus irregularibus angulo latiusculo adscendentibus, nervulis reticulatis vix prominulis; paniculæ terminales corymbiformes foliis breviores ubique dense ferrugineo-tomentosæ breviter pedunculatæ dense paucifloræ, bracteis subulatis parvis, pedicellis crassis usque ad 1.5 cm. longis; hypanthium obconicum 2 mm. longum, calyce æquilongo, lobis triangulari-ovatis obtusis erectis; petala alba glabra calyce duplo longiora; stamina valde inæqualia, longioribus calycem bene excedentibus; fructus obovoideus 1 cm. longus dense ferrugineo-tomentosus. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 800 m., April 11, 1934, William A. Schipp 1291 (Herb. Field Mus. No. 733,655, type); Camp 35, June 18, 1934 (fruit), Schipp 1312.

So far as I know, the genus *Photinia* has not been reported previously from Central America. The only closely related species is *P. mexicana* (Baill.) Hemsl., of Veracruz and Oaxaca, which has broader, conspicuously crenate leaves, larger flowers, and much larger fruit. Sterile specimens

collected by the writer (No. 56303) at Siguatepeque, Honduras, in 1928, taken from a tree of 6 meters, probably represent either *P. microcarpa* or a closely related species.

CONNARACEÆ

Rourea schippii sp. nov.—Frutex scandens 12-metralis, trunco 5 cm. diam., ramulis gracilibus striatis minute strigillosis vel fere omnino glabris; rhachis folii cum petiolo 11-13 cm. longa gracilis glabra; foliola 7, 3-4 mm. longe petiolulata ovata vel oblongo-elliptica 7-11 cm. longa 3.5-5.5 cm. lata breviter obtuse acuminata basi rotundata crasse membranacea glabra supra minute dense puncticulata, costa impressa, subtus fere concoloria costa gracili elevata, nervis lateralibus utroque latere 5 valde adscendentibus, nervulis prominulis reticulatis; paniculæ axillares ramosæ foliis duplo breviores, ramis pilis brevibus adscendentibus pilosis, bracteis minutis pilosis, floribus numerosis, pedicellis usque ad 11 mm. longis; sepala 2 mm. longa orbicularia apice late rotundata vel apiculata ciliata atque laxiuscule tomentulosa; petala alba spathulato-obovata 6-7 mm. longa glabra apice late rotundata vel truncata. British Honduras: In forest, Rio Grande, alt. 75 m., May 28, 1933, *William A. Schipp* 1168 (Herb. Field Mus. No. 671, 079, type).

The only Central American species that resembles this very closely is *R. pittieri* Blake, of Panama, which has narrower, acutish sepals and a viscid-pilose inflorescence. The common *R. glabra* HBK. differs, of course, in having narrower leaflets and almost or quite glabrous flowers.

LEGUMINOSÆ

Albizzia rubiginosa sp. nov.—Arbor 9-metralis, ramis teretibus brunneis, novellis minute sparse albido-strigillosis; stipulæ caducæ, non visæ; folia mediocria, petiolo 2-2.5 cm. longo puberulo medio glandula magna hemisphærica onusto, rhachi 4.5-5.5 cm. longa, pinnis circa 9-jugis 4-5.5 cm. longis, foliolis circa 38-jugis lineari-oblongis 4-6 mm. longis obtusis basi obliquis supra glabris subtus pallidioribus sparse pilosis vel subglabris; flores capitati, capitulis axillaribus geminatis, pedunculis 1.5 cm. longis puberulis; stamina numerosa, filamentis basi breviter connatis; fructus juvenilis breviter stipitatus linearis compressus planus 10 cm. longus 5-7 mm. latus apice angustatus et longiuscule rostratus, basin versus angustatus, ubique dense ferrugineo-tomentulosus. Campeche: Tuxpeña, in "bajo," October 26, 1931, *C. L. Lundell* 866 (Herb. Field Mus. No. 655,193, type).

From the few other species with similar foliage occurring in Central America, this is distinguishable at once by the dense rufous tomentum of the young pods. Only imperfect flowers are present on the type specimen, persisting at the bases of the fruits.

Mimosa scalpens sp. nov.—Frutex scandens 3-12-metralis, ramis crassis subteretibus striato-angulatis dense breviter pilosis dense aculeis nigrescentibus recurvis vel retrorsis vix 2 mm. longis armatis; folia magna 2.5-5 cm. longe petiolata, rhachi 4-13 cm. longa dense aculeolata, pinnis 3-10-jugis 3.5-6 cm. longis; foliola circa 14-18-juga oblonga 7-11 mm. longa 2.5-5 mm. lata breviter apiculato-acuminata basi obliqua late rotundata supra viridia sparse pilis brevibus subadpressis vel patulis pilosula, subtus pallidiora densius adpresso-pilosa 1-nervia, costa paullo excentrica; flores albi capitati

sessiles, capitulis axillaribus solitariis atque pedunculatis vel in racemos elongatos dispositis dense multifloris, pedunculis 1-2 cm. longis dense pilosis; calyx 1.5 mm. longus tubuloso-campanulatus infra lobos glaber, lobis tubo duplo brevioribus ovato-oblongis hirtellis erectis; petala 3 mm. longa lineari-spathulata acuta glabra; stamina 10 longe exserta; legumen lineari-oblongum circa 6 cm. longum et 1.5 cm. latum apice late rotundatum et mucronatum, basi plus minusve obliqua rotundatum vel obtusissimum brevissime stipitatum glabrum lucidum, articulis circa 8 latioribus quam longis, marginibus persistentibus densiuscule recurvo-aculeatis. British Honduras: Vicinity of Jacinto Hills, in forest, alt. 30 m., May 4, 1934, *William A. Schipp* 1306 (in fruit; Herb. Field Mus. No. 733,687, type). Dolores, in forest, 75 m., November 1932, *Schipp* S497.

Noteworthy for its scandent habit, the abundant recurved prickles of the branches, and the short broad pods with closely armed margins.

Pithecolobium halogenes sp. nov.—Arbor 10-metralis inermis, trunco 20 cm. diam., ramis teretibus striatis, novellis brunneo-tomentulosis mox glabris; folia 2 cm. longe petiolata, petiolo nudo; pinnæ 5-6-jugæ 6-8 cm. longæ, rhachi puberula vel hirtella inter paria pinnarum glandulis disciformibus depressis onusta; foliola circa 20-juga oblonga subcoriacea 7-11 mm. longa 2.5-4 mm. lata apice rotundata, basi obliqua obtusissima, supra fusca lucida glabra, nervis obsoletis, subtus pallidiora glabra vel in statu juvenili sparse sericea, rhachi pinnarum inter paria foliolorum glandulis parvis disciformibus onusta; flores albi brevissime racemosi, racemis capituliformibus multifloris axillaribus solitariis 1.5-3 cm. longe pedunculatis, pedicellis gracilibus 3-5 mm. longis minutissime puberulis vel fere glabris; calyx 1.3 mm. longus campanulatus sparse puberulus vel glabratus breviter irregulariter dentatus; corolla 5 mm. longa extus glabra vel glabrata, lobis triangulari-ovatis acutis erectis; stamina numerosa, filamentis exsertis, tubo incluso; legumen circinatum dehiscens circa 5-spermum compressum, valvulis coriaceis fere 1 cm. latis post dehiscentiam tortis; semina subglobosa 4 mm. lata cinerea et nigra laevia exarillata. British Honduras: Punta Gorda, mangrove swamp, July 3, 1933, *William A. Schipp* 1196 (Herb. Field Mus. No. 683,570, type).

This is not closely related to any other species known from the northern part of Central America. Conspicuous characters are the subumbellate, long-pedicellate flowers and the twisted valves of the fruit.

Pithecolobium pistaciifolium sp. nov.—Arbor 10-metralis, trunco 20 cm. diam., ramulis crassis multiangulatis griseis rimosis glabris; stipulæ persistentes et induratae spiniformes binæ 3-4 mm. longæ; folia mediocria 2-2.5 cm. longe petiolata, petiolo nudo, pinnis 3-4-jugis 4-8 cm. longis, rhachi folii inter pares pinnarum glandulis crasse clavatis apice depressis onusta, supra late sulcata; foliola vulgo 7-8-juga interdum alterna sessilia oblongo-lanceolata et plus minusve inæqualia 1-3 cm. longa 5-8 mm. lata versus apicem obtusum vel anguste rotundatum sensim angustata, basi cuneato-obtusa, supra olivacea ad costam puberula, costa elevata, venulis prominulis reticulatis, subtus concoloria fere omnino glabra, costa venulisque prominulis; flores albi spicati, spicis e ramis vetustioribus nascentibus circa 3 cm. longis dense multifloris sessilibus; calyx campanulatus 1 mm. longus glaber inæqualiter breviter dentatus; corolla glabra 5 mm. longa, lobis brevibus ovatis acutis erectis tubo plus quam duplo brevioribus; stamina numerosa,

filamentis alte connatis, tubo exserto. British Honduras: River bank, Rio Grande, January 3, 1934, *William A. Schipp* 1260 (Herb. Field Mus. No. 733,653, type).

In the absence of fruit, it is not quite certain to what subgenus of *Pithecolobium* this plant should be referred. However, it seems to be fully distinct from all species previously reported from this part of Central America, particularly in its rather large but narrow, somewhat trapezoidal leaflets.

Bauhinia emarginella sp. nov.—Arbor 9-metralis, trunco 10 cm. diam., inermis, ramulis gracilibus subteretibus dense pilis brevibus patentibus sordide brunneis tomentosis; folia magna petiolata firme membranacea, petiolo 2.5-3 cm. longo dense brunneo-pilosulo; lamina late elliptico-ovata vel subrotundata 8.5-14.5 cm. longa 8-11 cm. lata apice brevissime vel 5 mm. longe emarginata, basi breviter lateque cordata, supra laete viridis tantum ad costam minute pilosula aliter glabra, nervulis prominulis minute reticulatis, subtus paullo pallidior primo brunneo-tomentosa serius sparse breviter pilosa vel villosula, basi 9-nervia, nervis gracilibus prominentibus; flores racemosi, racemis laxe multifloris axillaribus circa 4.5 cm. longis et 2.5 cm. longe pedunculatis, bracteis minutis subulatis, pedicellis gracilibus 1-2.5 cm. longis dense brunneo-pilosis, alabastris lineari-oblongis 1.5 cm. longis 2 mm. latis; sepala lineari-oblonga 1.5 cm. longa attenuata brunneo-pilosa; petala anguste oblanceolato-spathulata acuminata longe unguiculata 2 cm. longa dorso sparse pilosa; stamen fertile 1; ovarium dense pilosum. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 750 m., March 11, 1934, *William A. Schipp* S630 (Herb. Field Mus. No. 733,491, type).

The collector states that the flowers are brick-red. The present plant belongs to the genus *Casparea*, as treated by Britton and Rose, and is related to *Bauhinia amblyophylla* Harms of Oaxaca, in which the young leaves are tomentose on both sides and the calyx is 2 cm. long.

Bauhinia sericella sp. nov.—Frutex scandens 15-metralis, trunco 5 cm. diam., inermis, cirrhifer, ramis brunnescentibus lenticellosis, novellis gracilibus minute strigillosis; folia parva petiolata basi subcordata bifoliolata, petiolo gracili 1.5-2.5 cm. longo; foliola late semiovata 4.5-5.5 cm. longa 2-2.8 cm. lata acuta vel breviter acuminata basi 5-nervia et late rotundata subcoriacea, supra glabra lucida nervis non elevatis, subtus brunnescentia minute pilis adpressis lutescentibus nitidis sericea, nervis tenerrimis prominulis, venulis vix elevatis laxe reticulatis; flores ochroleuci racemosi, racemis paucifloris vel multifloris usque ad 5 cm. longis, rhachi brunneo-sericea, pedicellis 4-7 mm. longis prope medium bracteolatis, bracteis bracteolisque minutis subulatis attenuatis; calyx campanulatus dense brunneo-sericeus 5-6 mm. longus conspicue 10-costatus brevissime dentatus, dentibus latis mucronatis; petala 12 mm. longa extus dense brunneo-sericea longe unguiculata; stamina perfecta 10 inclusa; legumen paucispermum circa 6.5 cm. longum et prope apicem 17 mm. latum plus minusve obliquum basi acutum atque breviter stipitatum, apice 6-7 mm. longe rostratum, minutissime dense brunneo-sericeum. British Honduras: Wooded stream bank, Jacinto Creek, alt. 15 m., July 14, 1933, *William A. Schipp* 1197 (Herb. Field Mus. No. 683,571, type).

A member of the subgenus *Schnella*. The only other North American species of this group with bifoliate leaves are *B. eucosma* Blake and *B. hymenæfolia* Triana, both of Panama, in which the calyx is 1.5 to 2.5 cm. long.

Cæsalpinia violacea (Mill.), comb. nov. *Robinia violacea* Mill. Gard. Diet. ed. 8, No. 8, 1768. *Cæsalpinia cubensis* Greenm. Trans. Acad. Sci. St. Louis, 7, 416, 1897. *Brasilettia violacea* Britt. & Rose, N. Amer. Fl. 23, 321, 1930.

Cassia petensis (Britt. & Rose), comb. nov. *Pseudocassia petensis* Britt. & Rose, N. Amer. Fl. 23, 231, 1930.—Based upon a single collection from Peten, Guatemala. The following collections appear, from description, to be conspecific: Guatemala: Lake Peten, *Lundell* 4393. British Honduras: El Cayo and vicinity, *Chanek* 101, 89. Little Cocquericot, Belize River, *Lundell* 4413. The species is noteworthy for the short, stout recurved stipular spines, a character not mentioned in the original description.

Swartzia lundellii sp. nov.—Ramuli crassi subteretes fusco-brunnei, novellis dense brunneo-tomentulosis, internodiis brevibus; stipulæ deciduæ lanceolatæ vel subulatæ 3-4 mm. longæ tomentosæ; folia 11-13-foliolata 1-2 cm. longæ petiolata, rhachi circa 10 cm. longa tomentosa; foliola subcoriacea 1.5 mm. longæ petiolulata oblonga vel anguste lanceolato-oblonga 3-8 cm. longa 1.5-2.2 cm. lata obtusa vel rotundata, interdum apicem versus paullo angustata, basi rotundata vel obtusissima, supra glabra vel ad costam tomentulosa nervulis prominulis arctissime reticulatis, subtus densiuscule minute sericea, pilis brunnescentibus interdum nitentibus, costa prominente; racemi ex axillis ramorum defoliatorum nascentes solitarii vel geminati foliis duplo breviores laxè pauciflori, rhachi puberula, pedicellis fructiferis crassis 2-4 mm. longis; legumen monospermum oblique ellipsoideum 2-3 cm. longum fere 2 cm. crassum glabrum apice 7-8 mm. longè rostratum, rostro crasso attenuato, fere 1 cm. longè stipitatum; semina fusca 12 mm. longa. Guatemala: La Libertad, Department of Peten, June 4, 1933, *C. L. Lundell* 3613 (Herb. Field Mus. No. 683, 774, type). *Lundell* 2958 and 3189 from the same locality represent the same species.

The only other North American species of the genus *Tounatea*—to which this would be referred by Britton and Rose—having numerous leaflets are *Swartzia cubensis* (Britt. & Wils.) comb. nov. (*Tounatea cubensis* Britt. & Wils. Bull. Torrey Club, 53, 460, 1926), and *S. nicaraguensis* (Britt. & Rose) comb. nov. (*Tounatea nicaraguensis* Britt. & Rose, N. Amer. Flora, 23, 347, 1930), both of which differ from *S. lundellii* in having acute or acuminate leaflets.

Calopogonium pedunculatum sp. nov.—Herba scandens, caulibus viridibus pilis longis rigidis albidis vel brunnescentibus sparse hirsutis, internodiis valde elongatis; stipulæ subpersistentes lanceolatæ vel lanceolato-ovatæ 3-4 mm. longæ acuminatæ striatæ virides hirtellæ; folia magna trifoliolata, petiolo 4-7 cm. longo sparse hirsuto striato, rhachi 1.5-2 cm. longa, stipellis lineari-oblongis parvis persistentibus; foliola 3-4 mm. longæ petiolulata ovata, rotundato-ovata vel ovato-elliptica 6-9.5 cm. longa 4-6 cm. lata membranacea integra acuta vel apice anguste rotundata et apiculata basi

late rotundata, supra læte viridia ad costam nervosque sparse breviter hirsuta, costa nervisque elevatis, subtus concoloria fere glabra vel ad costam sparse hirsuta; pedunculi longissimi axillares sparsissime hirsuti usque ad 38 cm. longi, racemis nodosis 1-4 cm. longis pauci- vel multifloris floribus sessilibus, bracteis calyce plus quam duplo brevioribus lanceolatis carinatis acutis ciliatis viridibus adpressis; calyx 4 mm. longus viridis ad medium lobatus fere glaber, lobo superiore late ovato obtuso, infimo lanceolato-lineari aliis longiore, omnibus dense ciliatis; vexillum in alabastro tantum visum 6 mm. longum ut videtur viridi-luteum extus glabrum; legumen lineare subteres 5.5 cm. longum 4 mm. latum sessile viride dense pilis longis rigidis brunnescentibus hirsutum apice recurvo-apiculatum inter semina paullo constrictum; semina numerosa, immatura fere 5 mm. longa brunnea lævia. Campeche: Tuxpeña, January 27, 1932, *C. L. Lundell* 1254 (Herb. Field Mus. No. 655,199, type).

It is not altogether certain that the present plant is properly referable to the genus *Calopogonium*, but it seems possible to place it more satisfactorily there than in the other related genera. It is especially noteworthy for the greatly elongate peduncles.

Desmodium cubense Griseb. *Meibomia cowellii* Britton, Bull. Torr. Bot. Club 41, 19, 1914—The species is known from Pinar del Río and the Isle of Pines, Cuba, and is recognized readily by its unifoliate leaves. Material collected recently in Peten, Guatemala, differs, apparently, only in having somewhat wider leaflets, oblong to oblong-elliptic, and proportionately shorter than in Cuban specimens. It may represent a geographic variety, but is hardly specifically distinct. Guatemala: Sabana San Francisco, La Libertad, Department of Peten, April 1933, *Lundell* 2468. Sabana Zizha, La Libertad, June 1933, *Lundell* 3667.

Galactia nitida sp. nov.—Frutex scandens, caule 6 mm. diam., ramis vetustioribus teretibus griseis rimosis, junioribus ochraceis, novellis pilis brevibus apice subhamatis hirtellis; stipulæ ovatæ acuminato-apiculatæ 3 mm. longæ striatæ; folia trifoliolata, petiolo 3.5 cm. longo glabrato, rhachi 2-3 cm. longa subtereti, stipellis filiformibus vel subulatis 2.5-3.5 mm. longis; foliola lanceolato-oblonga, oblonga vel oblongo-ovata 5.5-13 cm. longa 2-5.5 cm. lata apice acuta vel obtusa, rarius rotundata, basi rotundata, papyracea, supra in sicco fusco-viridia lucida fere omnino glabra, nervulis prominulis arcte reticulatis, subtus densissime pilis fulvis vel flavidulis nitentibus sericea, nervis lateralibus utroque latere circa 4 subarcuatis angulo acuto valde adscendentibus; flores pallide cærulei parvi, racemis laxè paniculatis 6 cm. longis breviter pedunculatis, rhachi vix nodosa pilis apice hamatis breviter pilosis, nodis paucifloris, bracteis minutis, pedicellis gracilibus 2-3 mm. longis; calyx 4 mm. longus sparse minutissime adpresso-pilosulus fere ad basin lobatus, lobis lanceolato-oblongis, lateralibus acuminatis, infimis filiformi-productis; vexillum 6-7 mm. longum glabrum; ovarium lineare stipitatum pilosum, stylo glabro elongato. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 810 m., April 8, 1934, *William A. Schipp* S680 (Herb. Field Mus. No. 733,495, type).

Very rare, according to the collector. A vine 2.5 meters long, with hard woody stems. Noteworthy for the very dense, yellowish, lustrous, silky pubescence of the lower leaf surfaces.

Lonchocarpus amarus sp. nov.—Arbor 24-metralis, trunco 60 cm. diam., ramulis crassis teretibus striatis lenticellis magnis elevatis albidis onustis, novellis minute sparse sericeis; folia 11-13-foliolata petiolata, rhachi 4-5.5 cm. longa gracili dense minute fulvo-sericea; foliola opposita 2-3 mm. longe petiolulata oblonga vel elliptico-oblonga circa 3.5 cm. longa et 15-18 mm. lata, apice rotundata vel obtusissima interdum excisa, basi rotundata vel obtusa, papyracea, supra in sicco fusca glabra venulis prominulis laxe reticulatis, subtus densiuscule pilis minutis nitentibus fulvidis sericea, marginibus plus minusve undulatis; flores purpurei racemosi, racemis usque ad 13 cm. longis in paniculas magnas dispositis laxe multifloris, rhachi sericea, pedicellis 3-5 mm. longis; calyx 6-7 mm. longus anguste campanulatus basi acutus vel attenuatus dense pilis minutis brunneis vel nigrescentibus sericeus, ore paullo dilatatus minute dentatus, dentibus obtusis; vexillum glabrum 1.5 cm. longum; ovarium lineare dense sericeum. British Honduras: Rio Grande, alt. 75 m., in forest, February 7, 1933, *William A. Schipp* 1120 (Herb. Field Mus. No. 669,145, type).

Vernacular name, "bitterwood." A *Lonchocarpus* with no outstanding characters—in this respect like most members of the genus—but hardly referable to any of the species previously reported from Central America.

Lonchocarpus castilloi Standl. Trop. Woods, 32, 15, 1932—This species was based upon two collections, the type from Freshwater Creek Reserve, British Honduras, and a specimen from Peten. Several additional specimens, cited below, have been received since the description was published, and they show that the species is one of the most distinct of all those occurring in Central America. It is recognized easily by the narrow leaflets with invariably revolute margins. The flowers are relatively small, only 8 mm. in length, and the standard is densely sericeous on the outer surface. British Honduras: Xiabe, Corozal District, *Gentle* 850; Corozal District, *Gentle* 476; without locality, in 1933, *A. Castillo* 61, 83. The tree is called "cabbage-bark" or "black cabbage-bark."

Machærium habroneurum sp. nov.—Frutex scandens 12-metralis, trunco 5 cm. diam., ramulis crassis griseis, junioribus ferrugineis rimosis dense lenticellis magnis albidis elevatis conspersis glabris; stipulæ spiniformes 2-3 mm. longæ induratae recurvæ nigrescentes persistentes; foliola ut videtur 7-9 subcoriacea 2 mm. longe petiolulata oblonga vel cuneato-oblonga 2.5-3.5 cm. longa 1-1.5 cm. lata apice breviter vel profunde lateque retusa, basi obtusa, glabra, supra olivacea puncticulata nervis vix manifestis, subtus pallidiora, costa gracili elevata, nervis numerosissimis obscuris parallelis, marginibus cartilagineo-induratis; flores purpurei in paniculas parvas densas paucifloras dispositi, ramis adpresso-setulosis, bracteis parvis ovatis acutis persistentibus, floribus sessilibus; calyx 3 mm. longus extus sparse sericeus vel glabratus anguste campanulatus, dentibus brevibus triangulari-ovatis obtusis erectis; vexillum extus dense sericeum calyce duplo longius. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 810 m., March 11, 1934, *William A. Schipp* S676 (Herb. Field Mus. No. 733, 487, type).

The available material is unsatisfactory because the leaves disarticulate badly when dried, and the inflorescences also are broken. The plant, however, clearly is related to *M. merrillii* Standl., also of British Honduras, which has much more numerous and much smaller leaflets, longer stipular spines, and setose branches.

Machærium merrillii Standl. Field Mus. Pub. Bot., 8, 15, 1930—Since the description of this well-marked species was published, based upon material from Stann Creek Railway, British Honduras, two additional collections have been received: British Honduras: Malfredi Lagoon, alt. 30 meters, May 1933, *Schipp* S555; a scandent shrub, common in the open along edge of lagoon; flowers dark rose. Guatemala: Sabana San Francisco, La Libertad, Peten, April 1933, *Lundell* 2399.

Machærium roscens sp. nov.—Frutex scandens 9-metralis, trunco 5 cm. diam., ramulis crassis ferrugineis rimosis sparse minute sericeis; stipulæ persistentes triangulari-oblongæ 3-4 mm. longæ acutæ erectæ induratae sed vix spinescentes; folia majuscula 5-7-foliolata petiolata, rhachi subtereti puberula vel glabrata; foliola subcoriacea 2-4 mm. longæ petiolulata oblonga vel ovato-oblonga 4.5-7 cm. longa 18-24 mm. lata acuta vel breviter obtuse acuminata, basi rotundata, supra in sicco brunnescentia sublucida, costa nervisque impressis, venulis obsoletis, glabra, subtus multo pallidiora dense minutissime flavido-sericea, costa gracili elevata, nervis lateralibus utroque latere circa 9 elevatis angulo semirecto adscendentibus subarcuatis marginem attingentibus, nervulis vix prominulis laxè reticulatis; flores ex albo rosei parvi in paniculas magnas laxas multifloras pyramidales usque ad 25 cm. longas dispositi, ramis gracilibus minute brunneo-sericeis, bracteis parvis inconspicuis, bracteolis rotundato-ovatis imbricatis apice rotundatis vel obtusis, floribus glomeratis sessilibus; calyx campanulatus 3 mm. longus extus dense brunneo-pilosulus, breviter dentatus, dentibus latis obtusis erectis; vexillum 6-7 mm. longum latum extus minute sericeum. British Honduras: Big Rock, Toledo, in forest, December 22, 1932, *William A. Schipp* 1091 (Herb. Field Mus. No. 1091, type).

The only related species of Central America is *Machærium woodworthii* Standl., described recently from Panama. In that the flowers are larger and the broader leaflets are rounded at the apex.

Ormosia toledoana sp. nov.—Arbor 12-metralis, trunco 60 cm. diam., ramulis crassis in sicco fuscis, novellis sparse minute sericeis, mox glabratiss, internodiis brevibus; folia magna 7-foliolata longè petiolata, rhachi minute griseo-sericea; foliola subcoriacea 5 mm. longæ petiolulata oblonga vel ovato-oblonga 6-12 cm. longa 3-4.5 cm. lata versus apicem obtusum paullo angustata, basi rotundata vel obtusissima, glabra vel glabrata, supra sublucida nervulis prominulis arcte reticulatis, costa subimpressa, subtus concoloria, costa gracili elevata, nervulis vix prominulis; flores racemoso-paniculati, paniculis magnis, racemis laxè multifloris usque ad 12 cm. longis, rhachi dense minute griseo-sericea, floribus solitariis 3-5 mm. longæ pedicellatis; calyx dense minute griseo-sericeus 6-8 mm. longus basi acutiusculus, lobis ovatis tubo paullo longioribus acutis; legumen (valde immaturum tantum visum) sessile monopermum dense griseo-sericeum apice breviter rostratum. British Honduras: Forest Home, Toledo, alt. 60 m., in open pasture, November 4, 1932, *William A. Schipp* 1052 (Herb. Field Mus. No. 699,150, type).

The collector states that the seeds are red, but none are present with the type specimen. The species of *Ormosia* growing in Central America are very imperfectly known, because of the lack of adequate material. One other that grows in British Honduras, referred tentatively to *O. coarctata* Jacks., is altogether unlike the present species in its copious spreading pubescence.

Tipuana lundellii sp. nov.—Arbor alta, ramulis crassis fuscis striatis rimosis lenticellis magnis elevatis conspersis; folia 11-15-foliolata petiolata, rhachi gracili minute sericea vel puberula; foliola alterna 2-3 mm. longe petiolulata elliptica vel oblongo-elliptica 2.5-5 cm. longa et 1.3-2 cm. lata vel ultra, versus apicem truncatum vel late excisum paullo angustata, basi rotundata vel obtusa, crasse chartacea, supra viridia glabra costa impressa, nervis prominulis, subtus paullo pallidiora primum dense sericea vulgo mox glabrata, costa elevata, nervis lateralibus numerosis fere rectis angulo lato divergentibus prominulis sed inconspicuis; samara ut videtur breviter stipitatum glabrum 10-13 cm. longum, parte seminifera crassa 2.5 cm. lata, ala 2.5-3 cm. lata. Guatemala: La Libertad, Department of Peten, April 18, 1933, C. L. Lundell 2895 (Herb. Field Mus. No. 693,899, type). British Honduras: Vicinity of El Cayo, in 1933, Mercedes Chanek 163; vernacular name "*machuh*."

The species here described represents one of the most remarkable plant discoveries that has been made recently in Central America, for heretofore the genus *Tipuana* has been known only in South America, where it ranges from Amazonian Brazil to Argentina. Unfamiliar with the distinguishing characters of *Tipuana*, I at first referred the cited collections to *Machærium*, the only North American genus with similar fruit. As indicated by Benthams, the fruits of the two genera are easily distinguishable, the wing in *Tipuana* having numerous transverse parallel nerves, while in *Machærium* the nervation is reticulate and longitudinal. *T. lundellii* appears to have much larger samaras than the South American species.

RUTACEÆ

Amyris rhomboidea sp. nov.—Arbor 10-metralis, trunco 20 cm. diam., ramis tortuosis gracilibus teretibus griseis rimosis, novellis minute puberulis vel glabratis, internodiis brevibus; folia opposita 5-7-foliolata 1 cm. longe petiolata, rhachi gracili minute puberula; foliola rhombico-lanceolata vel rhombico-ovata vix 1 mm. longe petiolulata 15-30 mm. longa 7-11 mm. lata obtuse acuta vel acuminata, rare obtusa, basi obtusa et sæpe paullo obliqua, crasse membranacea, supra in sicco fusco-viridia glabra lucida, costa prominente, nervulis prominulis reticulatis, subtus pallidiora minutissime puberula vel glabra, costa prominula, nervis venulisque obsoletis; flores parvi paniculati, paniculis sessilibus vel breviter pedunculatis foliis subæqualibus laxè multifloris, ramis gracilibus minute puberulis, bracteis minutis ovatis persistentibus, pedicellis 1-2 mm. longis; calyx minutus dentatus, petalis albis 2 mm. longis obovatis apice rotundatis grosse punctatis; ovarium glabrum. British Honduras: Jacinto Hills, alt. 270 m., in forest, December 11, 1933, William A. Schipp 1227 (Herb. Field Mus. No. 706,952, type).

A well-marked species, related to *Amyris elemifera* L. and *A. balsamifera* L., but distinguished conspicuously from both by the small, almost sessile leaflets.

POLYGALACEÆ

Bredemeyera lucida (Benth.) A. Benn.—In 1930 (Field Mus. Pub. Bot., 8, 17) the writer reported this genus for the first time from North America, from British Honduras. It is perhaps worth while to record several additional collections that have become available during the past five years. British Honduras: Rio Privacion, Mountain Pine Ridge, a shrub of 0.5 to

3.5 meters, the flowers greenish yellow, *Bartlett* 11863. North Stann Creek Valley, common in pine-hardwood transition, a liana of 15 meters, *J. B. Kinloch* 169; vernacular name "tie-tie." Stann Creek Valley, a liana of 10 meters, frequent, *Kinloch* 210. All Pines, in open forest, a vine of 12 meters, the trunk 6 cm. in diameter, common, *Schipp* 697. Guatemala: La Libertad, *Lundell* 2847.

Polygala jamaicensis Chodat—The plants segregated by some authors under the genus *Badiera* DC., but more commonly treated as members of the genus *Polygala*, comprise a small group of plants confined to the West Indies. It is of considerable interest, therefore, to be able to report one of them from the continent. *Polygala jamaicensis* has been known previously only from Jamaica, but its occurrence in British Honduras and Peten is not surprising, since a similar distribution is illustrated in various other plants of the Yucatan Peninsula. British Honduras: Camp 36, British Honduras-Guatemala boundary, in forest, alt. 780 meters, a shrub 1 meter high, with yellow flowers, June 1934, *Schipp* 1254. Guatemala: Lake Peten, May 1933, *Lundell* 3187.

EUPHORBIACEÆ

Alchornea oblongifolia sp. nov.—Arbor 15-metralis, trunco 45 cm. diam., ramulis in sicco fuscis subteretibus lævibus glabris; folia estipellata petiolata chartacea, petiolo tereti 2-3.5 cm. longo; lamina anguste oblonga vel lanceolato-oblonga 16-24 cm. longa 4.5-7 cm. lata breviter acuminata, apice acuto, basin obtusum versus paullo angustata, glabra, fere ad basin conspicue crenato-serrata, supra in sicco olivacea dense minute pallido-puncticulata, costa nervisque elevatis, nervulis prominulis, subtus pallidior, costa gracili elevata, penninervia, nervis lateralibus utroque latere circa 11 gracilibus angulo semirecto adscendentibus subarcuatis, venulis vix prominulis laxè reticulatis; flores ut videtur dioici, femineis simpliciter racemosis, racemis petiolis aequilongis laxè paucifloris, pedicellis 1.5 mm. tantum longis, sepalis 4 lineari-oblongis 1.5 mm. longis adpressis; capsula juvenilis tricoeca minute sparse pilis adpressis simplicibus pilosa laevis, stylis bifidis. British Honduras: In forest, Camp 35, British Honduras-Guatemala boundary, alt. 750 meters, June 3, 1934, *William A. Schipp* S729 (Herb. Field Mus. No. 733,496, type).

Altogether distinct from the other Central American species in the large, narrow, penninerved, coarsely crenate-serrate leaves.

Croton campechianus sp. nov.—Frutex, ramulis crassiusculis griseis tere-tibus glabris, internodiis brevibus; stipulæ parvæ lineari-subulatæ caducæ; folia parva longe petiolata membranacea, petiolo gracili 2-2.5 cm. longo glabro; lamina ovato-oblonga vel lanceolato-oblonga 5-8 cm. longa 2-3.5 cm. lata longiuscule acuminata acumine ipso obtuso, basi rotundata vel leviter emarginata, integra, supra in sicco viridis glabra, costa non elevata, nervis inconspicuis, subtus pallidior minute puncticulata, fere glabra, hinc inde ad costam hirtella, costa pallida elevata gracili, penninervia, nervis lateralibus utroque latere circa 7 angulo acuto adscendentibus tenerrimis inconspicuis; racemi juveniles pedunculati 3 cm. longi dense multiflori, floribus fere omnibus masculis, uno tantum nodi infimi femineo, pedicellis 3-6 mm. longis glabris; sepala floris feminei anguste oblonga 4.5-5 mm. longa fere glabra apice obtusa vel rotundata viridia; styli sessiles bifidi; flores

masculi in alabastro globosi fere glabri 2 mm. diam. Campeche: Dzibalchen, March 12, 1932, *C. L. Lundell* 1398 (Herb. Field Mus. No. 655,124, type).

The material is immature and without opened staminate flowers or capsules, but it seems to represent a well-marked species. Distinctive characters are found in the narrow, entire, bright green, glabrous leaves.

Croton lundellii sp. nov.—Arbor, ramulis crassis ferrugineis teretibus, novellis dense minute adpresse stellato-lepidotis, internodiis brevibus; folia mediocria petiolata chartacea, petiolo 1.5-3 cm. longo albido-lepidoto vel glabrato apice glandulis 2 magnis crateriformibus onusto; lamina ovato-oblonga 7-11 cm. longa 3-5 cm. lata apicem obtusum vel submarginatum versus sensim angustata, basi late rotundata, irregulariter sinuato-crenata vel grosse duplici-crenata, supra in sicco fusca primum dense adpresse minutae stellato-lepidota serius glabrata, subtus pallidior densissime atque minutissime stellato-lepidota, pilis albidis, basi 3 vel obscure 5-nervia, nervis prominentibus gracilibus; racemi longe pedunculati usque ad 20 cm. longi laxi multiflori, floribus femineis remotis solitariis vel fasciculatis sessilibus; capsula 5-6 mm. alta adpresse stellato-lepidota laevis; semina fusco-brunnea vel fere nigra lucida fere 5 mm. longa. Campeche: Tuxpeña, October 11, 1931, *C. L. Lundell* 806 (Herb. Field Mus. No. 655,174, type).

"A common tree," according to the collector. The species is fairly well marked by the ovate-oblong, sinuate-crenate or doubly crenate leaves, whose indument consists of minute, whitish, closely appressed, stellate scales.

Euphorbia floresii sp. nov.—Planta tota intense viridis glabra ut videtur perennis herbacea, radicibus fibrosis, usque ad 30 cm. alta, dense ramosa, ramis suberectis crassis acute 4-5-angulatis, angulis angustissimis, inter angulos profunde sulcatis, alternis; folia parva alterna crassiuscula integra breviter petiolata, plerumque prope apices ramorum subdense conferta, lamina elliptico-oblonga, lanceolato-oblonga vel oblongo-ovata, circa 2 cm. longa, acuta vel subobtusata, basi acuta, decidua; involucra ut videtur terminalia et sessilia, solitaria; capsula breviter stipitata et recurva glabra trigono-globosa 3 mm. alta et 3.5 mm. lata obtuse angulata et leviter sulcata, basi leviter concava. Mexico: Along the railroad between Merida and Progreso, Yucatan, June 1931, *Dr. Román S. Flores* (Herb. Field Mus. No. 637,957, type).

The description is based upon a good photograph and decidedly unsatisfactory and fragmentary material of the plant, supplied by Dr. Flores, who furnishes the following notes regarding it:

"This plant grows in dry places along the right of way of the railroad between Progreso and Merida. It is very common, especially near this port. Never more than 25 to 30 cm. high. The prismatic stems bear impressions as if they had been formed by superimposed leaves. The leaves are alternate and grouped near the ends of the branches. The very small flowers are white. Vernacular names, 'acam,' 'acam-xiu.'"

Because of the incomplete material available for study, it is difficult to refer the plant to its proper position within the genus, but it is clearly altogether unlike any *Euphorbia* known from the region. Its alliance may be with *E. cassythoides* Boiss. and *E. alata* Hook., West Indian plants that are quite different, and perhaps not at all closely related. It is rather remarkable that so strange a plant should not have been noted in Yucatan by Dr.

C. F. Millspaugh, considering his intense interest in the genus, but it may be that it was observed only in a sterile state and therefore not collected.

Pera barbellata Standl. Field Mus. Pub. Bot., 8, 19, 1930—Based originally upon a single collection from Mullins River Road, British Honduras, this species has been collected recently at several new localities. British Honduras: All Pines, secondary forest, *Schipp* 568; a tree of 12 meters, the trunk 20 cm. in diameter. Machaca, in forest, *Schipp* S578; a tree of 9 meters, with trunk diameter of 20 cm. Guatemala: Santa Teresa, Subin River, *Lundell* 2686. La Libertad, *Lundell* 3067.

Phyllanthus bartlettii sp. nov.—Frutex gracilis erectus 60-120 cm. altus ramosus, ramis elongatis ferrugineis teretibus rimosis, novellis minutissime puberulis vel papilloso-scaberulis, internodiis brevibus vel elongatis; folia mediocria petiolata tenuiter membranacea, petiolo gracillimo 5-8 mm. longo, papilloso-scaberulo; lamina lanceolato-oblonga vel ovato-oblonga 5-7.5 cm. longa 1.7-2.8 cm. lata acuminata vel longiacuminata, acumine acuto vel attenuato, basi obtusa vel acuta, glabra, supra viridis, costa prominula, nervis inconspicuis, subtus pallidior, costa gracillima elevata, nervis lateralibus utroque latere circa 5 tenerrimis angulo acuto adscendentibus pallidis prominulis, nervulis obsoletis; flores ut videtur dioici, masculi tantum visi, axillares, fasciculati, pedicellis filiformibus glabris 2-3 mm. longis interdum recurvis; sepala alba tenuia 1.5 mm. longa rotundata glabra; stamina 5. British Honduras: River bluffs, El Cayo, February 13, 1931, *H. H. Bartlett* 11441 (Herb. Field Mus. No. 661,817, type). San Antonio, May 1931, *Bartlett* 13037.

Not closely related to any other Central American species, so far as I know, and well marked by the relatively large, acuminate, very thin, bright green leaves, combined with the large size and shrubby habit of the plant.

Phyllanthus nobilis (L. f.) Muell. Arg. var. *hypomalacus* var. nov.—A forma typica non nisi foliis subtus sparse vel dense pilis mollibus pallidis patentibus villosulis differt. Mexico: Tuxpeña, Campeche, a shrub of 2.5 meters, November 4, 1931, *C. L. Lundell* 897 (Herb. Field Mus. No. 655,207, type); Sinaloa, in 1933, *J. G. Ortega* 7060. British Honduras: Pueblo Nuevo, New River, vernacular name "*ramón macho*," *Percy H. Gentle* 538. Honduras: San Pedro Sula, August 1929, *W. N. Bangham* 319. Costa Rica: Paso Tempisque, 80 meters, August 1932, *H. E. Stork* 4030.

The usual form of *Phyllanthus nobilis*, a species of wide distribution in tropical America, especially in coastal thickets and cut-over land, has leaves that are quite glabrous, even in their youngest stages. The present plant differs only in the softly pubescent lower surface of the leaves, a character that probably is of slight importance, but still a rather conspicuous one. Mueller von Argau described several varieties of *P. nobilis*, but for only one, var. *guyanensis* of French Guiana, does he mention pubescence, stating that the leaves at first are sparsely pubescent but later glabrate. Incidentally, in this connection, it may be mentioned that it still is to be guessed why the specific name *nobilis* was given to this species, an unimportant shrub of the most ordinary appearance that it is possible to picture for a plant.

ANACARDIACEÆ

Astronium fraxinifolium Schott.—The species of *Astronium* are of some importance as a source of lumber, and their occurrence consequently a matter of economic interest. One, *A. graveolens* Jacq., is common along the Atlantic coast of Central America and in some parts of the Pacific watershed. *A. fraxinifolium*, of wide distribution in South America, has been known heretofore in North America only from Veracruz, where it was collected by Purpus. The same species has been found recently in Central America. Guatemala: La Libertad, Peten, April 1933, *Lundell* 2881.

CELASTRACEÆ

Rhacoma eucymosa (Loes. & Pitt.), comb. nov. *Myginda eucymosa* Loes. & Pitt. Contr. U. S. Nat. Herb., 12, 175, pl. 18, 1909.

Maytenus belizensis sp. nov.—Arbor 10-metralis, trunco 20 cm. diam., omnino glabra, ramulis cinereis brevibus rigidis dense lenticellatis angulatis; folia mediocria breviter petiolata integra coriacea, petiolo crassiusculo 4-6 mm. longo; lamina oblonga, elliptico-oblonga vel rare elliptica 4.5-7 cm. longa 1.5-2.5 cm. lata apicem obtusum vel rotundatum versus paullo angustata, basi acuta vel rare obtusa vel rotundata, supra sublucida costa gracili elevata, nervis vix manifestis, venulis obsoletis, subtus paullo pallidior, costa nervisque obsoletis; flores axillares pedicellati solitarii vel fasciculati, pedicellis crassis rectis 3-4 mm. longis; calyx basi capsulæ persistens 2 mm. latus disciformis breviter obtuse dentatus; capsula monosperma ellipsoidea vel obovoidea apice apiculata 6-9 mm. longa aurantiaco-rubra lævis. British Honduras: In forest, Jacinto Hills, alt. 270 meters, November 8, 1933, *William A. Schipp* S617. (Herb. Field Mus. No. 706,947, type).

Similar to *Maytenus longipes* Briq., which differs in its usually abruptly acuminate leaves, larger capsules, and longer pedicels.

SAPINDACEÆ

Cupania prisca sp. nov.—Arbor, trunco 25 cm. diam., ramulis gracilibus teretibus cinereis, novellis plus minusve angulatis minute fulvido-puberulis; folia 6-foliolata petiolata, rhachi gracili dense puberula, petiolulis 2-3 mm. longis; foliola lanceolato-oblonga chartacea 8-13 cm. longa 3-4.5 cm. lata obtuse acuminata, basi inæquali acuta ad rotundata, integra, lucida, supra in sicco luteo-viridia, costa nervisque prominentibus, nervulis prominulis arcte reticulatis, subtus concoloria, costa nervisque prominentibus, venulis arcte reticulatis; flores parvi fasciculati laxè paniculati, paniculis pauciramosis 5-6 cm. longis angustis, ramis gracilibus dense puberulis, pedicellis crassis circa 1 mm. longis, bracteis subulatis parvis; sepala sublibera 1.5 mm. longa ovata obtusa extus dense flavido-tomentulosa, intus glabra, petalis rudimentariis; stamina breviter exserta, antheris magnis 1 mm. longis ellipsoideis. Guatemala: Uaxactun, Department of Peten, March 28, 1931, *H. H. Bartlett* 12341 (Herb. Field Mus. No. 678,593, type).

It is not altogether certain, in the absence of fruit, that this plant really belongs to the genus *Cupania*, but it must be of that relationship, and I have been unable to place it with greater certainty in any other genus. It somewhat resembles *Cupania macrophylla* A. Rich. of Mexico and Central America, which is distinguished at once by its broader, obtuse leaflets.

Serjania pterarthra sp. nov.—Frutex scandens, ramulis gracilibus 5-angulatis, ad angulos setoso-hispidis, aliter glabris, setis pallidis 2-3 mm. longis interdum furcatis; corpus lignosum compositum e centrali majore 5-sulcato et 5 periphericis parvis subteretibus vel plus minusve compressis; folia decomposita, segmentis 2 basalaribus pinnatis, terminali pinnato-ternata, rhachi latissime alata 6-7 mm. lata; foliola lanceolato-oblonga vel anguste oblonga 2.5-4.5 cm. longa 8-12 mm. lata acuminata basi acuta vel obtusa versus apicem crenata, crenationibus vulgo utroque latere 2, glabra, supra læte viridia lucida venulis prominulis reticulatis, subtus pallidiora, costa crassiuscula elevata, venis prominentibus reticulatis; paniculæ racemi-formes 6-8 cm. longæ 2-2.5 cm. latæ, floribus cymosis, cymulis laxis paucifloris pedunculatis, pedunculis patentibus sparse minute pilosulis, bracteis primariis lanceolato-triangularibus 1-1.5 mm. longis, pedicellis gracilibus usque ad 2 mm. longis puberulis; sepala viridescencia 2-2.2 mm. longa ovalia extus minute puberula apice rotundata; petala obovata 2.5 mm. longa ciliolata apice rotundata; stamina petalis vix longiora, filamentis pilosis. Mexico: Tuxpeña, Campeche, March 23, 1932, *C. L. Lundell* 1404 (Herb. Field Mus. No. 655,125, type).

Although the fruit, upon which the subdivisions of the genus are based, is unknown for this plant, I do not hesitate to describe it as new, since the foliage is strikingly unlike that of any species known from Mexico or Central America.

Talisia diphylla Standl. Field Mus. Pub. Bot., 8, 21, 1930—Based upon *Gaumer* 23573 from Kancabtsonot, Yucatan. Several recent collections show that the species has a rather wide range in the Yucatan Peninsula. The apparently mature fruits are about 1 cm. in diameter. Yucatan: Progreso, in 1934, *Dr. Román S. Flores*; vernacular names "esculinché" and "culinché." Campeche: Tuxpeña, a large tree, February 1932, in flower, *Lundell* 1347. British Honduras: Maskall Pine Ridge, February 1934, *Gentle* 1147. Freshwater Creek Reserve, in primary intermediate forest, flowers yellow, January 1932, *A. Castillo* 25; vernacular name "*wayam cosh*," evidently a bad spelling of a Maya name.

Talisia floresii Standl. Trop. Woods, 26, 14, 1931—The species was based upon rather fragmentary material taken from a tree in cultivation at Progreso, Yucatan, and collected by *Dr. Román S. Flores*. More recently ample material has been received from Campeche and Peten, well illustrating all parts of the tree. Campeche: Tuxpeña, November 1931, in fruit, a tree in *bajo*, 18 meters high, the trunk 30 cm. in diameter, *Lundell* 917; in flower, March 1932, a small tree, *Lundell* 1408. Guatemala: San Andres, Lake Peten, *Lundell* 3121. Kantetul Bajo, Department of Peten, *Lundell* 3185. Uaxactun, Peten, trunk 37 to 45 cm. in diameter, the wood hard, flowers white, *Bartlett* 12680, 12661.

TILIACEÆ

Sloanea schippii sp. nov.—Arbor 10-12-metralis, trunco 15-20 cm. diam., ramis gracilibus cinereis striatis, novellis minute cinereo-puberulis vel glaberratis; stipulæ deciduæ subulatæ pilosulæ 4-5 mm. longæ; folia inter minora petiolata crasse membranacea integra vel leviter undulata, petiolo gracili 2-3.5 cm. longo minute puberulo; lamina lanceolato-oblonga 9-13 cm. longa 3-4.5 cm. lata longe anguste acuminata, acumine obtuso, basi cuneato-acuta

vel subobtusata, supra in sicco fusco-viridis glabra, costa nervisque subimpressis, subtus pallidior brunnescens ad nervos costamque puberula vel fere glabra, costa gracili elevata, nervis lateralibus utroque latere circa 9 arcuatis tenerrimis angulo latiusculo adscendentibus; flores racemosi, racemis paucifloris laxis solitariis vel fasciculatis petiolis æqualibus vel eis vix longioribus, pedicellis gracilibus usque ad 13 mm. longis dense cinereo-puberulis; sepala anguste triangularia 3 mm. longa attenuato-acuta dense puberula; stamina numerosissima 4-5 mm. longa dense puberula, antheris acutiusculis vix 1 mm. longis; stylus dense pilosulus, ovario ovoideo densissime piloso; capsula globosa vel globoso-ovoidea 10-13 mm. longa tomentosa apice rotundata vel obtusa densissime setis rigidis 2-3 mm. longis antrorse scabris obtecta. British Honduras: Rio Grande, alt. 90 meters, April 21, 1933, *William A. Schipp* 1163 (Herb. Field Mus. No. 671,086, type; in flower). Camp 36, British Honduras-Guatemala boundary, alt. 900 meters, June 1934, *Schipp* 1245 (in fruit).

Sloanea schippii is closely related to the Guatemalan *S. meianthera* Donn. Smith, the leaves being almost exactly alike in both species, but in the latter the stamens are glabrous rather than pubescent. The description of the fruit is based on the second collection cited, which may possibly be referable rather to *S. meianthera*, whose fruit has not been described.

DILLENIACEÆ

Davilla aspera (Aubl.) Naud.—From Central America there have been known two species of *Davilla*, *D. kunthii* St. Hil and *D. rugosa* Poir. *D. aspera* ranges from Trinidad through the Guianas to Brazil. The British Honduras specimens cited here differ from the Guiana plant only in minor details which probably are of little systematic importance. British Honduras: Corozal District, in "high ridge," *Gentle* 460. Corozal-Pachacan Road, Corozal District, *Gentle* 828.

MARCGRAVIACEÆ

Marcgravia schippii sp. nov.—Frutex scandens glaber 24-metralis, trunco 7.5 cm. diam., ramis crassis subteretibus vel obtuse angulatis ferrugineis sparse lenticellatis; folia ramorum fertilium coriacea sessilia 7-8 cm. longa 2-3 cm. lata apicem anguste obtusum versus paullo angustata, basi valde obliqua uno latere rotundata alio acuta, supra in sicco opaca brunnescens costa subimpressa, subtus paullo pallidior, costa crassiuscula prominente, utrinque enervia, subtus prope marginem linea glandularum nigrarum onusta; inflorescentia umbelliformis circa 10-flora, pedicellis rectis 5-5.5 cm. longis crassis, floribus recte insertis, bracteolis 2 ad basin calycis insertis late rotundatis 3-4 mm. longis; sepala 4-6 mm. longa latiora quam longa, apice truncata vel late rotundata et pallide marginata, arcute adpressa; bractee steriles non visæ, caducæ; petalorum calyptra oblongo-ovoidea fere 1 cm. longa apice late rotundata; ovarium globosum abrupte in stylum crassum contractum, cum stylo 8 mm. longum. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 840 meters, May 6, 1934, *William A. Schipp* 1273 (Herb. Field Mus. No. 733,638, type).

"Rare; flowers cream-colored; fruit red." The most common species of Central America, *Marcgravia nepenthoides* Seem., which also occurs in British Honduras, has narrowly long-acuminate leaves with conspicuous lateral nerves and obliquely inserted flowers.

GUTTIFERÆ

Clusia belizensis sp. nov.—Arbor 9-metralis omnino glabra, trunco 30 cm. diam., ramulis crassis subteretibus striatis, internodiis brevibus; folia breviter petiolata crasse coriacea, petiolo crasso 8-10 mm. longo involuto supra profunde canaliculato; lamina oblonga, elliptica vel obovato-oblonga 8-14 cm. longa 4-7 cm. lata apice late rotundata basi acuta concolor, costa supra subplana, subtus crassa elevata, nervis lateralibus utrinque prominulis teneris numerosissimis approximatis parallelis in marginem desinentibus; flores feminei terminales solitarii breviter crasse pedunculati, bracteolis 2 late rotundatis 8 mm. longis; sepala 4 ovato-rotundata apice late rotundata 15-17 mm. longa. British Honduras: On hill top in forest, Camp 33, British Honduras-Guatemala boundary, alt. 870 meters, April 10, 1934, William A. Schipp 1242 (Herb. Field Mus. No. 733,654, type).

The material available is incomplete as regards the flowers, which are in unsatisfactory condition for study, but in leaf form alone this *Clusia* is clearly distinct from any other species known from Central America.

Clusia lundellii sp. nov.—Omnino glabra, ramulis crassis teretibus striatis; folia mediocria breviter petiolata crasse coriacea, petiolo crasso 1.5-3 cm. longo supra late canaliculato; lamina anguste oblonga vel obovato-oblonga 14-17 cm. longa 4.5-8 cm. lata apice anguste vel late rotundata, basi cuneato-acuta vel basin versus longe sensim attenuata, concolor, costa supra subplana subtus prominente crassa, nervis lateralibus utrinque prominentibus numerosissimis valde obliquis angulo acutissimo adscendentibus; flores feminei terminales solitarii 3-3.5 cm. longe pedunculati, pedunculo paribus 5 bracteolarum onusto, bracteolis rigidis viridibus subpatentibus 4-10 mm. longis rotundato-ovatis; sepala 4 inæqualia ovato-rotundata 1-1.5 cm. longa apice late rotundata, marginibus tenuibus; capsula ovalis 3.5 cm. longa 2.5 cm. lata sessilis. Guatemala: Monte Santa Teresa, Department of Peten, April 14, 1933, C. L. Lundell 3072 (Herb. Field Mus. No. 749,577, type). British Honduras: Silk Grass, vernacular name "mata-palo," in 1928, Neil S. Stevenson 12 (leaves only).

Known only from incomplete and somewhat unsatisfactory material, but clearly unlike all the other Central American species of *Clusia* in the narrow leaves with very oblique and strongly ascending nerves.

VIOLACEÆ

Hybanthus ipecacuanha (L.) Taub.—This well-marked species, quite different in most of its characters from other Central American representatives of the genus, has a wide distribution in South America, from Venezuela and the Guianas through Brazil to Paraguay, but it is not recorded, so far as I know, from North America. The following collection from British Honduras appears to differ in no respect from the various forms of the species as it occurs in Brazil: Big Fall Pine Ridge, June 1933, C. L. Lundell 4230.

Hybanthus subsessilis sp. nov.—Arbor 6-18-metralis omnino glabra, trunco usque ad 45 cm. diam., ramulis crassis teretibus ochraceis rimosis sparse lenticellatis, internodiis brevibus; stipulæ late rotundatæ mucronatæ caducæ; folia magna alterna vel subopposita chartacea subsessilia vel 5 mm. tantum longe petiolata, petiolo crasso supra late canaliculato marginato;

lamina anguste oblonga vel oblanceolato-oblonga 12-27 cm. longa 4-8 cm. lata acuminata vel acuta versus basin anguste rotundatam paullo angustata, supra basin remote adpresse undulato-serrata, supra in sicco laete viridis vel cinereo-viridis, costa versus basin plana versus apicem elevata, nervis prominentibus, venulis prominentibus arcte reticulatis, subtus concolor, costa ut nervis venulisque prominentibus, nervis lateralibus utroque latere circa 15 gracilibus arcuatis prope marginem irregulariter conjunctis, venulis arcte reticulatis; inflorescentiæ cymosæ in axillis supremis insertæ et pseudo-umbellatæ, pedunculis complanatis 7-11 cm. longis rectis vel paullo incurvis, cymis laxè multifloris 5-6 cm. longis et aequilatis basi umbellatim ramosis, floribus pernumerosis, pedicellis usque ad 2 mm. longis, bracteis minutis latis; sepala subæqualia rotundata pallida vix 1 mm. longa; petala inæqualia, antico 2 mm. longo extus puberulo sessili basi vix dilatato, in limbum dilatatum profunde retusum expanso, albo; stamina glabra, filamentis complanatis in tubum brevem coalitis, antheris ovalibus, appendice brevi rotundata; stylus crassiusculus subsigmoideo-curvatus; capsula obtuse trigona 1 cm. longa viridis apice late rotundata trilocularis ut videtur trisperma; semina subglobosa 5 mm. diam. ochracea laevia. Guatemala: In forest, Jocolo, Rio Perdonales, Izabal, *Harry Johnson 1071* (Herb. Field Mus. No. 707,652, type). British Honduras: In forest, Rio Grande, alt. 75 meters, March 2, 1933, *William A. Schipp 1132*.

This plant and the one here described as *Hybanthus malpighiifolius* evidently are closely related, although quite distinct from each other. Their proper generic position is, however, a matter of uncertainty. In general appearance—leaf form and especially the many-flowered, long-stalked inflorescences—they appear very unlike any plants heretofore referred to the genus *Hybanthus*; yet I have been unable to find any structural characters by which they may be separated, although I have a suspicion that ultimately they will be found to constitute a distinct generic type. The genus *Hybanthus* is extremely variable in flower structure, and there seems to be nothing besides the form of the inflorescence on which to segregate the present plants. More than that, *Hybanthus yucatanensis* Millsp. has a cymose inflorescence essentially like that of these two species, although in no other respect similar to them. It may be mentioned, further, that the size of the trees, if correctly reported, is most unusual in *Hybanthus*, although some of the species of Costa Rica and Panama frequently attain a height of 2 to 5 meters.

Hybanthus malpighiifolius sp. nov.—Arbor 10-metralis glabra, trunco 15 cm. diam., ramulis gracilibus cinereis rimosis, novellis viridibus; stipulæ minutæ caduæ; folia mediocria breviter petiolata chartacea, petiolo gracili 3-10 mm. longo; lamina anguste lanceolata vel oblango-lanceolata 6-14 cm. longa 1.5-4.5 cm. lata longe anguste attentuata, apice ipso acuminato, basi acuta vel attenuato-decurrens, in toto margine remote adpresso-serrata, in sicco laete viridis lucida, costa supra versus basin plana, versus apicem elevata, nervis venulisque utrinque prominentibus, nervis lateralibus utroque latere circa 10 angulo lato divergentibus prope marginem irregulariter conjunctis gracilibus, venulis arcte reticulatis; flores albi cymosi, cymis laxè multifloris longipedunculatis axillaribus et ad apices ramorum pseudo-umbellatis, 1.5-2.5 cm. latis et fere aequilongis, pedunculis angulatis vel complanatis 3-4.5 cm. longis rectis, bracteis minutis triangulari-ovatis, acutis, pedicellis usque ad 2 mm. longis; sepala subæqualia late ovata acuta vel obtusa 1 mm. longa; petalum anticum aliis longius 2 mm. longum extus

puberulum basi paullo dilatatum; capsula immatura subglobosa 4 mm. longa apice apiculata. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 630 meters, March 7, 1934, *William A. Schipp* 1278 (Herb. Field Mus. No. 733,689, type).

Although evidently congeneric with *Hybanthus subsessilis* and related to it, the present plant is widely different in its small, narrowly long-attenuate leaves and in its small, relatively few-flowered inflorescences.

FLACOURTIACEÆ

Homalium riparium sp. nov.—Arbor 10-metralis, trunco 20 cm. diam., ramis gracilibus cinereo-brunnescentibus dense pallido-lenticellatis, novellis glabris; folia mediocria breviter petiolata firme membranacea, petiolo gracili 5-8 mm. longo glabro; lamina oblongo-lanceolata vel anguste oblongo-lanceolata 7-11.5 cm. longa 2.5-3.5 cm. lata acuminata vel longe angustaque acuminata, basi acuta vel acuminata, grosse fere ad apicem serrata, dentibus obtusis subadpressis, glabra, sublucida, in sicco fusca, costa nervisque ut quoque venulis utrinque prominentibus, nervis lateralibus utroque latere circa 8 leviter arcuatis, venulis laxè reticulatis; racemi axillares numerosi longi laxè multiflori 11-16 cm. longi pedunculati, pedunculo glabro, rhachi dense puberula, pedicellis infimis usque ad 14 mm. longis, rectis, superioribus 3-5 mm. longis; hypanthium obconicum basi acutum; sepala lanceolato-oblonga 2-5-3 mm. longa obtusa extus tomentulosa, circa 1.3 mm. lata; petala alba 4 mm. longa oblongo-elliptica acuta vel subobtusa utrinque dense tomentulosa; stamina 3 in quoque fasciculo, filamentis filiformibus glabris, antheris minutis didymo-globosis; styli 3 distincti; ovarium conicum dense hirsutum. British Honduras: River bank, Rio Grande, alt. 10 meters; July 16, 1933, *William A. Schipp* 1182 (Herb. Field Mus. No. 683,569, type).

According to the collector, the flowers have an unpleasant odor. Among Central American representatives of the genus, this is noteworthy for its narrow, long-acuminate leaves and very long pedicels.

Lunania sessiliflora sp. nov.—Arbor 6-metralis omnino glabra, trunco 7.5 cm. diam., ramulis gracilibus teretibus ferrugineis sparse lenticellatis, plus minusve flexuosis, internodiis brevibus; folia breviter petiolata subcoriacea, petiolo 4-5 mm. longo; lamina ovata 4.5-8.5 cm. longa 2.5-4 cm. lata acute acuminata, basi obliqua uno latere rotundata alio acuta, in fere toto margine argute serrata, supra lucida in sicco fusca costa subimpressa, nervulis vix prominulis, subtus concolor opaca, basi 5-nervia, costa nervisque prominentibus gracilibus, venulis prominulis laxè reticulatis; flores minuti spicati, spicis simplicibus axillaribus et terminalibus gracilibus erectis 6-8 cm. longis remotifloris, floribus numerosis solitariis sessilibus, bracteis minutis; alabastra vix 1.2 mm. longa, sepalis late rotundatis. British Honduras: In forest, Jacinto Hills, alt. 120 meters, "rare," November 4, 1933, *William A. Schipp* S606 (Herb. Field Mus. No. 706,944, type).

The only other species known from Central America, *Lunania piperoides* Standl. of Honduras, differs in its large, entire leaves, barbate beneath along the nerves, and in its branched inflorescences with larger, pedicellate flowers.

ONAGRACEÆ

Jussiaea nervosa Poir. in Lam. Encycl. Suppl., 3, 199, 1813—In Micheli's account of the genus *Jussiaea* in the *Flora Brasiliensis* (vol. 13, pt. 2), this

species is reported to range from Colombia to Brazil and, so far as I know, it has not been recorded from Central America until the present time. *Jussiaea nervosa* is an exceptionally well-marked species for the genus, and it is a striking addition to the list of South American species which in Central America are known only from British Honduras. The collection seen is the following. British Honduras: All Pines, swampy places, January 1931, *W. A. Schipp* 678; a shrub 2 meters high with yellow flowers.

Oocarpon torulosum (Arn.) Urban—An herbaceous plant, in aspect much like a *Jussiaea*, occurring in Cuba, the Guianas and Brazil, but not known previously from the North American continent. The following collections have been seen recently by the writer. British Honduras: All Pines, swampy places, very rare, the flowers cream-colored, February 1931, *Schipp* S185. Panama: Shore between Zetek and Armour houses, Barro Colorado Island, in 1934, *Otis Shattuck* 1161.

MYRTACEÆ

Calyptanthus megistophylla sp. nov.—Arbor 15-metralis fere omnino glabra, trunco 30 cm. diam., ramulis crassis ochraceis rimosis subteretibus, novellis glabris; folia maxima breviter petiolata subcoriacea glabra, petiolo crasso 10-13 mm. longo; lamina anguste oblonga circa 35 cm. longa et 11-12 cm. lata (obtusa?) basi obtusa, supra in sicco fusca costa plana vel subimpressa, nervis prominulis, subtus paullo pallidior dense puncticulata, brunnescens, costa gracili elevata, nervis lateralibus numerosis prominulis tenerrimis fere rectis in nervum collectivum inframarginalem conjunctis, venulis prominulis laxè reticulatis; paniculæ magnæ multifloræ 7-8 cm. longe pedunculatæ usque ad 15 cm. longæ et æquilatæ, ramis complanatis latis, infimis verticillatis patentibus, ultimis umbellatis minute sparse pilis ferrugineis adpressis conspersis, floribus sessilibus vel subsessilibus ad apices ramorum capitato-glomeratis; alabastra subglobosa punctata glabra apice apiculata vix 3 mm. longa; petala alba rotundata 3 mm. longa grosse punctata; stamina numerosissima longe exserta. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 810 meters, May 7, 1934, *William A. Schipp* 1265 (Herb. Field Mus. No. 733,532, type).

Among all the Central American species of *Calyptanthus*, this may be recognized immediately by its extraordinarily large leaves.

Eugenia bumelioides sp. nov.—Arbor 7.5 m. alta, trunco 10 cm. diam., ramulis gracilibus teretibus cinereis rimosis, junioribus cinereo-ferrugineis, novellis dense ferrugineo-sericeis; folia parva petiolata subcoriacea, petiolo 4-6 mm. longo glabro; lamina ovata vel elliptico-ovata 4.5-6 cm. longa 2.3-2.8 cm. lata longe abrupte caudato-acuminata, acumine angusto attenuato obtuso, basi acuta vel subabrupte breviter decurrens, glabra, supra in sicco fusca costa profunde impressa, nervis vix manifestis, subtus brunnescens, costa gracili elevata, dense punctata, nervis lateralibus utroque latere circa 9 vix prominulis tenerrimis fere rectis angulo lato divergentibus prope marginem in nervum collectivum conjunctis, nervulis obscuris laxè reticulatis; flores axillares pauci fasciculati, pedicellis 5 mm. longis dense ferrugineo-tomentulosi; hypanthium obovoideum vix 2 mm. longum dense ferrugineo-tomentosum, basi bracteolis 2 angustis fulcratum; sepala ovato-triangularia fere 2 mm. longa acuta vel obtusa tomentulosa; petala alba orbicularia sepalis fere duplo longiora glabra dense punctata; stamina numerosa ex-

serta. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 640 meters, March 20, 1934, *William A. Schipp* 1270 (Herb. Field Mus. No. 733,658, type).

A plant of no conspicuously distinctive characters, like most members of the genus *Eugenia*, but scarcely referable to any of the species previously known from northern Central America.

Eugenia lundellii sp. nov.—Frutex vel arbor 3-12-metralis, cortice pallido lævi, ramis teretibus griseis, junioribus ferrugineis, novellis ferrugineo-sericeis, internodiis brevibus; folia parva breviter petiolata coriacea, petiolo 2-5 mm. longo glabro; lamina elliptica vel obovato-elliptica, rarius oblongo-obovata, 3-4 cm. longa 1-2.5 cm. lata obtusa vel rotundata, basi cuneato-acuta, glabra vel primum utrinque ferrugineo-sericea et cito glabrata, supra in sicco cinereo-viridis sublucida, costa profunde impressa, nervis obsoletis, subtus multo pallidior dense puncticulata, costa gracili elevata, nervis lateralibus utroque latere circa 9 angulo semirecto adscendentibus rectis prominulis prope marginem in nervum collectivum conjunctis, nervulis perobscuris; flores pauci axillares fasciculati, pedicellis gracilibus usque ad 1 cm. longis primum dense griseo-sericeis mox glabratis; flores bene evoluti non visi, in alabastris pilis ferrugineis et cinereis intermixtis sericei, bracteolis minutis lanceolatis; sepala ad apicem baccæ persistentia ovalia vel rotundata 2 mm. longa glabrata; fructus subglobosus glabratus 4-5 mm. longus basi abrupte in stipitem brevem contractus. Campeche: Tuxpeña, December 25, 1931, *C. L. Lundell* 1130 (Herb. Field Mus. No. 652,217, type). Chan Laguna, December 6, 1931, *Lundell* 1016. Guatemala: Uaxactun to San Clemente, April 30, 1931, *H. H. Bartlett* 12801.

The three collections, all exactly alike in essential characters, represent a well-marked species, with, however, no outstanding differential characters.

MELASTOMACEÆ

Blakea cuneata sp. nov.—Frutex vel arbor 2.5-7.5 m. alta, trunco 5-10 cm. diam., ramulis subteretibus glabratis, novellis furfuraceo-puberulis; folia petiolata subcoriacea, petiolo crasso 1-2 cm. longo primum furfuraceo-puberulo cito glabrato supra anguste marginato; lamina anguste elliptico-oblonga 8-13 cm. longa 3-5.5 cm. lata abrupte acuminata, acumine angusto attenuato obtuso, basi acuta, triplinervia, supra in sicco fusca glabra minute albido-puncticulata sublucida, nervis non elevatis, subtus fere concolor, brunnescens, ad nervos sparse furfuraceo-puberula vel fere omnino glabra, nervis gracilibus prominentibus, nervulis transversis creberrimis rectis vix prominulis; flores 1 cm. longe pedicellati, pedicellis crassiusculis glabratis; bracteæ valde inæquales, exterioribus foliaceis circa 2.5 cm. longis ovatis obtuse acuminatis, basi 5 mm. alte connatis, glabris vel glabratis, lamina oblique patente, interioribus 14 mm. tantum longis late ovatis subobtusis; calyx late campanulatus 14 mm. longus tantum ad lobos extus sparse furfuraceo-puberulus, breviter 6-lobus, lobis semiorbicularibus 4-5 mm. longis apiculatis; petala rosea glabra 1.5 cm. longa subrotundata; antheræ oblongæ obtusæ 5-6 mm. longæ, filamentis æquilongis complanatis glabris; stylus crassiusculus glaber 1.5 cm. longus. British Honduras: In forest, Rio Viejo, alt. 300 meters, November 20, 1933, *William A. Schipp* S604 (Herb. Field Mus. No. 706, 949, type). In forest, a common epiphyte, Camp 32, British Honduras-Guatemala boundary, April 22, 1934, *Schipp* 1237.

In *Blakea guatemalensis* Donn. Smith, the only other species of northern Central America, the leaves are 5-nerved and rounded at the base.

Henriettea succosa (Aubl.) DC. *Henriettella macrocalyx* Standl. Field Mus. Bot., 8, 31, 1930—Comparison of the type of *Henriettella macrocalyx* with material of *Henriettea succosa* from Panama and South America shows clearly that the former is a synonym. The following collections from Central America have been seen. Panama: Pena Blanca Bay, Barro Colorado Island, July 1934, *Otis Shattuck* 1093. British Honduras: Stann Creek Railway, *William A. Schipp* 388, type of *H. macrocalyx*; Jacinto Creek, July 1933, *Schipp* 1184. *H. macrocalyx* was based upon material without petals, hence the erroneous reference of the plant to *Henriettella*. *Henriettea succosa* has been reported previously from Panama, but the British Honduras collections extend the range a long distance northward.

ARALIACEÆ

Oreopanax lachnocephala sp. nov.—Arbor 18-metralis, trunco 30 cm. diam., ramulis crassis dense pilis ferrugineis stellato-tomentosis; folia magna longissime petiolata subcoriacea, petiolo 15-18 cm. longo et ultra tomentoso; lamina palmatim 7-loba circa 26-28 cm. lata ad medium lobata basi late cordata, lobis oblongis circa basin paullo contractis longiacuminatis integris, lamina supra in sicco griseo-viridi lucida glabra, nervis prominulis, venulis prominulis et arcte reticulatis, subtus fere concolore stellatim ferrugineo-tomentosa; flores capitati, capitulis subglobosis 1.5 cm. diam. densissime multifloris crasse 1-1.5 cm. longe pedunculatis in paniculam magnam terminalem dispositis, panicula circa 19 cm. longa et æquilata, capitulis numerosis, ramis crassis dense ferrugineo-tomentosis patentibus, bracteis triangulari-ovatis acuminatis adpressis 7-8 mm. longis dense tomentosis, bracteis capitulorum dense ferrugineo-villosis, calyce villosus; fructus immaturus oblongus 7 mm. longus glaber apice depressus. British Honduras: In forest, Camp 31, British Honduras-Guatemala boundary, alt. 630 meters, March 3, 1934, *William A. Schipp* 1272 (Herb. Field Mus. No. 733,641, type).

The only similar species of Central America is *Oreopanax salvinii* Hemsl., in which the leaves are glabrate, their lobes variously lobed or toothed and merely acute or obtuse, and the pistillate heads few-flowered.

THEOPHRASTACEÆ

Jacquinia cuneata sp. nov.—Arbor 7.5 m. alta, trunco 30 cm., diam., ramis teretibus ferrugineis, novellis olivaceis minutissime puberulis densiuscule foliatis; folia parva rigide coriacea breviter petiolata in sicco pallide viridia, petiolo crasso puberulo 2-3 mm. longo; lamina obovata, oblongo-obovata vel rotundato-obovata 2-4 cm. longa 1-2 cm. lata, apice obtusa vel late rotundata et brevissime spinuloso-apiculata, basi cuneata et sensim in petiolum decurrens, 1-nervia, glabra, concolor, utrinque sparse minutissime puncticulata, costa subtus prominente, venis tenerrimis obscuris; inflorescentia racemosa foliis triplo longior et ultra pedunculo elongato incluso 7-10 cm. longa laxa circa 10-flora, pedicellis patentibus supra valde incrassatis 8-15 mm. longis glabris bracteam parvam ovatam vel rotundatam ciliatam paullo supra basin gerentibus; sepala rotundata 4 mm. longa viridia glabra, marginibus tenuibus albescentibus; corolla intense aurantiaca

glabra 8-9 mm. longa, petalis ad medium vel ultra in tubum latum connatis, lobis late rotundatis; staminodia lobis corollae duplo breviora rotundata, antheris staminodiis paullo brevioribus apice emarginatis, filamentis tantum ad basin coalitis; bacca globosa circa 1.5 cm. diam. glabra lucida stylo persistente 2-3 mm. longo terminata. Mexico: Tuxpeña, Campeche, November 14, 1931, *C. L. Lundell* 941 (Herb. Field Mus. No. 655,192, type); February 8, 1932, *Lundell* 1305.

All the Mexican species of *Jacquinia* are closely related and rather difficult of differentiation. *J. cuneata* is most closely related to *J. racemosa* DC., of Tamaulipas, which has longer, narrow leaves. It resembles also *J. flammea* Millsp., of Yucatan, in which the leaves usually have a muticous apex, and the staminodia are narrow and elongate.

Jacquinia schippii sp. nov.—Arbor 10-metralis, trunco 20 cm. diam., omnino glabra; folia mediocria breviter petiolata subcoriacea, petiolo 2-4 mm. longo marginato; lamina oblonga vel anguste oblanceolato-oblonga 3-5 cm. longa 1-2 cm. lata apice anguste rotundata vel obtusissima mutica basin versus longe sensim angustata, supra in sicco flaveni-viridis sublucida sparse minute puncticulata, costa obsoleta, plus minusve longitrorsum striata, subtus concolor, costa versus basin prominente, versus apicem evanescente, ubique longitrorsum striolata sparse minute puncticulata, margine corneo; flores ut videtur breviter racemosi, non visi; pedicelli fructiferi 1 cm. longi graciles, calyce sub fructu 5 mm. lato adpresso, sepalis latissimis apice late rotundatis, latioribus quam longis, marginibus minute erosis; fructus subglobosus lucidus 1 cm. longus laevis apice apiculatus. British Honduras: Jacinto Hills, in forest, alt. 270 meters, December 11, 1933, *William A. Schipp* 1233 (Herb. Field Mus. No. 706,942, type).

The leaves are quite unlike those of other species of the region, obtuse or rounded and muticous at the apex, and with conspicuous longitudinal nerve-like striæ, especially on the lower surface.

SAPOTACEÆ

Dipholis durifolia sp. nov.—Arbor 6-metralis, trunco 12 cm. diam., ramulis crassiusculis teretibus brunnescentibus dense foliatis rimosis, novellis pilis rufis et cinereis intermixtis sericeis; folia mediocria longe petiolata subrigide coriacea, petiolo gracili pallido 18-25 mm. longo; lamina anguste lanceolato-oblonga 7.5-9 cm. longa 1.7-2.5 cm. lata glabra longe attenuato-acuminata, basi acuta, supra in sicco griseo-viridis pallido-punctata lucida, costa nervisque non elevatis, subtus multo pallidior, costa gracili elevata, nervis lateralibus utroque latere circa 14 pallidis obscuris non elevatis angulo latiusculo adscendentibus fere rectis, venulis obscuris arcte reticulatis non elevatis, marginibus corneo-incrassatis; flores axillares fasciculati, pedicellis 5-7 mm. longis rufo-tomentosis; alabastra ovoidea obtusa, sepalis late ovatis obtusis extus dense rufo-tomentosis 3.5-4 mm. longis; corolla glabra ut videtur (in alabastro) sepalis paullo brevior, lobis brevibus late ovatis obtusis, appendicibus ovatis dentatis acuminatis; staminodia ovata dentata; stylus brevis glaber; ovarium ovoideum glabrum. British Honduras: On bare hill tops, Jacinto Hills, alt. 210 meters, rare, September 8, 1933, *William A. Schipp* 1202 (Herb. Field Mus. No. 683,576, type).

"Flowers creamy white." Somewhat similar to *Dipholis salicifolia* (L.) A. DC., a common tree of the Yucatan region, in which the leaves are much thinner and the flowers scarcely more than half as large.

Sideroxylon lundellii sp. nov.—Rami crassiusculi teretes rimosi plus minusve striati brunnescentes, novellis dense pilis adpressis brunneis sericeis; folia parva breviter petiolata chartacea, petiolo lato submarginato supra late canaliculato minute sericeo 7-8 mm. longo; lamina ovalis, elliptica vel obovato-elliptica 6-9 cm. longa 3-4.5 cm. lata apice obtusa vel rotundata et abrupte breviter acuminata, acumine circa 5 mm. longo lato obtuso, basi acuta et abrupte in petiolum breviter decurrens, supra opaca brunneo-viridis glabra, costa non elevata, nervis gracilibus prominentibus, venulis laxe reticulatis, subtus fere concolor glabra vel tantum ad costam nervosque minute sparse sericea, costa gracili prominente, nervis lateralibus utroque latere circa 13 angulo fere recto divergentibus tenerrimis prominulis, venulis prominulis reticulatis; flores parvi fasciculati numerosi axillares et infra-axillares e ramis annotinis nascentes, pedicellis crassiusculis 3-4 mm. longis subrectis dense minute fulvido-sericeis; sepala 4 late rotundata adpressa extus minute sericea; corolla calyce paullo longior glabra fere ad medium 4-loba, lobis late rotundatis patentibus; stamina prope apicem tubi inserta, antheris parvis subglobosis, staminodiis parvis carnosulis ovatis; ovarium dense pilosum, stylo brevi crasso. Guatemala: Monte Santa Teresa, Department of Peten, April 12, 1933, *C. L. Lundell* 2767 (Herb. Field Mus. No. 683,783, type).

This plant represents a distinct type among the numerous Sapotaceæ already known from the Yucatan Peninsula, which evidently is the center of distribution for the family in continental North America. It is not similar to the other *Sideroxylon* species of the region, nor does it resemble closely any other plant of the family known from the area.

Sideroxylon rufotomentosum sp. nov.—Arbor 24-metralis, trunco 90 cm. diam., ramulis crassis dense foliatis subteretibus dense ferrugineo-tomentosis; folia longe petiolata crasse membranacea, petiolo crasso 2.5-3 cm. longo dense rufo-tomentoso; lamina oblonga vel obovato-oblonga 6.5-8.5 cm. longa 2.5-3.5 cm. lata apice rotundata basi obtusa utrinque dense pilis intertextis rufis tomentosa, costa nervisque supra non elevatis, costa subtus elevata gracili, nervis lateralibus utroque latere circa 17 angulo lato fere recto divergentibus fere rectis marginem attingentibus, venulis tomento occultis; fructus (unus tantum visus) crasse 11 mm. longe pedicellatus, globosus umbonato-apiculatus 1 cm. longus rufo-tomentulosus vel glabratus basi rotundatus; sepala 5 persistentia late rotundata inæqualia extus rufo-tomentella 3-4 mm. lata et paullo breviora. British Honduras: In forest, Camp 32, British Honduras-Guatemala boundary, alt. 810 meters, March 28, 1934, *William A. Schipp* S674 (Herb. Field Mus. No. 733,478, type).

The material available is scant and badly preserved, consisting of apparently young leaves and a single detached fruit. It is evident that the specimen represents a member of the Sapotaceæ hitherto unknown from Central America, although perhaps of uncertain generic position. In view of the economic importance of trees of this family, it seems desirable to assign a name to the tree, rather than await the uncertain arrival of further and better specimens.

EBENACEÆ

The family Ebenaceæ as represented in America has been considered usually as divisible into two genera, *Diospyros* and *Maba*, both of which are represented even more abundantly in the tropics of the Old World.

Diospyros has been characterized as having a 4- or 8- to 16-celled ovary and usually 4- to 6-parted calyx and corolla; *Maba* as having a 3- or 6-celled ovary and 3-parted calyx and corolla. There is no isolation in range of the genera, species of both often occurring in the same region. In habit or general appearance of the plant there are no distinctive characters. The number of cells in the ovary is known to be variable, and the number of calyx lobes varies upon the same branch. The writer has for some time been of the opinion that the two groups should be united as the genus *Diospyros*, and this view is confirmed in a recent publication¹ by R. C. Bakhuizen van den Brink, who has transferred to *Diospyros* all the Malayan species of *Maba*. Below there are listed a number of new names necessary for the proper arrangement of the species represented in the herbarium of Field Museum. Many of the species heretofore referred to *Maba* were described originally in the genus *Diospyros*.

Diospyros caribæa (A. DC.) comb. nov. *Macreightia caribæa* A. DC. in DC. Prodr., 8, 221, 1844. *Maba caribæa* Hiern, Trans. Cambridge Phil. Soc. 12, 125, 1873.

Diospyros crassinervis (Krug & Urban) comb. nov. *Maba caribæa* (A. DC.) Hiern var. *crassinervis* Krug & Urban, Bot. Jahrb., 15, 327, 1892. *Maba crassinervis* Urban, Symb. Ant., 7, 329, 1912.

Diospyros grisebachii (Hiern) comb. nov. *Macreightia buxifolia* Griseb. Cat. Pl. Cub., 169, 1866, non *Diospyros buxifolia* Hiern, 1873. *Maba grisebachii* Hiern, Trans. Cambridge Phil. Soc., 12, 125, 1873.

Diospyros intricata (Gray) comb. nov. *Macreightia intricata* Gray, Proc. Amer. Acad. Sci., 5, 163, 1862. *Maba intricata* Hiern, Trans. Cambridge Phil. Soc., 12, 126, 1873.

Diospyros leonis (Britt. & Wils.) comb. nov. *Maba leonis* Britt. & Wils. Bull. Torr. Bot. Club, 53, 462, 1926.

Diospyros nicaraguensis (Standl.) comb. nov. *Maba nicaraguensis* Standl. Contr. U. S. Nat. Herb., 20, 193, 1919.

Diospyros portus nom. nov. *Maba rekoi* Standl. Contr. U. S. Nat. Herb., 20, 193, 1919, non *Diospyros rekoi* Standl., 1927.

Diospyros æquoris nom. nov. *Maba latifolia* Standl. Contr. U. S. Nat. Herb. 18, 118, 1916, non *D. latifolia* Guerke, 1899.

Diospyros sintenisii (Krug & Urban) comb. nov. *Maba sintenisii* Krug & Urban, Bot. Jahrb., 15, 327, 1892.

Diospyros veræ-crucis (Standl.) comb. nov. *Maba veræ-crucis* Standl. Contr. U. S. Nat. Herb., 18, 119, 1916.

Diospyros schippii sp. nov.—Arbor 15-metralis, trunco 20 cm. diam., ramis cinereis, junioribus subteretibus vel obtuse angulatis, novellis sparse

¹ Enumeration of Malayan Ebenaceæ (with brief descriptions of new and noteworthy species), Gardens' Bull. Straits Settlements, vol. 7, 161-189, pl. 48-50, 1933.

strigosis; folia parva breviter petiolata subcoriacea, petiolo 5-7 mm. longo supra anguste canaliculato glabro; lamina anguste oblongo-lanceolata 6-9 cm. longa 1.5-2 cm. lata versus apicem anguste obtusum sensim angustata, versus basin acutum æqualiter angustata, medio latissima, glabra, supra in sicco fusco-viridis sublucida, costa plana, nervis inconspicuis, subtus opaca brunnescens, costa gracili elevata, nervis lateralibus utroque latere circa 7 inconspicuis tenerrimis vix prominulis irregularibus angulo semirecto adscendentibus, nervulis vix prominulis laxè reticulatis, marginibus sub-revolutis; fructus subglobosus 12 mm. longus apice late rotundatus et apiculatus dense ochraceo-sericeus vel glabratus; calyx persistens adpressus 8-9 mm. latus leviter 4-lobus sparse minute strigillosus vel glabratus, lobis apice rotundatis; semina obscure brunnea fere lævia ovalia 9 mm. longa. British Honduras: In forest, Camp 34, British Honduras-Guatemala boundary, alt. 780 meters, June 11, 1934, *William A. Schipp* 1281 (Herb. Field Mus. No. 733,639, type).

A close relative of this species is *Diospyros bumelioides* Standl., of British Honduras and Campeche. In that the calyx is much larger, and the leaves are cuneate-spatulate, with rounded or emarginate apex.

Diospyros yatesiana sp. nov.—Arbor 15-metralis, trunco 50 cm. diam., ramulis sat gracilibus subteretibus fusco-griseis glabris, vetustioribus rimulosis et sparse lenticellatis; folia magna breviter petiolata papyracea, petiolo crasso 6-10 mm. longo dense puberulo; lamina elliptica vel elliptico-oblonga 11-16 cm. longa 4-8 cm. lata acuta vel breviter triangulari-acuminata basi obtusa vel rarius acuta supra in sicco luteo-viridis lucida minutissime scaberulo-puberula, subtus glabrata, costa gracili elevata, nervis lateralibus utroque latere circa 11 gracilibus arcuatis angulo acuto adscendentibus, venulis prominentibus laxè reticulatis; baccæ breviter crassissime pedicellatæ globosæ 2.3 cm. latæ sparse strigosæ vel glabratae apice late rotundatæ; calyx sub baccam persistens 1.5 cm. latus extus ut intus dense strigosus ad medium 4-lobus, lobis ovato-rotundatis obtusis reflexis. Mexico: Tuxpeña, Campeche, February 10, 1932, *C. L. Lundell* 1309 (Herb. Field Mus. No. 655,181, type). Chan Laguna, Campeche, December 5, 1931, *Lundell* 1020.

At the request of Mr. Lundell, this tree is named for Mr. Sheldon S. Yates, President of the Chicle Development Company and the Mexican Exploitation Company, through whose interest there was obtained the rich collection of plants made in Campeche and Guatemala during the winter of 1931-32. It is a well-marked species of persimmon, related, presumably, to *D. ebenaster*, which has fruit twice as large as the Campeche tree.

GENTIANACEÆ

Lisianthus collinus sp. nov.—Herba erecta metralis glabra ramosa, ramis viridibus teretibus, internodiis elongatis foliis sæpe longioribus; folia sessilia vel subsessilia opposita oblongo-ovata vel ovata 3.5-5.5 cm. longa 1.5-2 cm. lata acuta vel acuminata basi rotundata vel obtusa, supra in sicco viridia enervia, costa impressa, subtus paullo pallidiora, costa gracili elevata utroque latere nervos 1-2 prominulos emittente; flores lutei cymosopaniculati in paniculas magnas latas terminales dispositi subsessiles et solitarii vel 1-2 cm. longe pedicellati, pedicellis ut quoque ramis cymarum acute angulatis; sepala pallida 7 mm. longa fere ad basin distincta lineari-

lanceolata longe attenuata erecta et adpressa; corolla 3 cm. longa vel paullo ultra angusta, tubo gracili supra ovarium paullo angustato deinde tubuloso-dilatato et 2.5 mm. lato, lobis erectis ovato-oblongis apiculato-acuminatis 6 mm. longis; stamina corollæ subæquilonga; stylus brevissime exsertus; capsula oblonga 8 mm. longa. British Honduras: On hilltop in shade, Jacinto Hills, alt. 90 meters, September 1, 1933, *William A. Schipp* 1205 (Herb. Field Mus. No. 683,573, type).

Lisianthus axillaris (Hemsl.) Kuntze, which has been collected several times in British Honduras, has axillary flowers rather similar in size and form to those of the present species.

Lisianthus congestus sp. nov.—Herba erecta glabra, caulibus teretibus viridibus gracilibus; folia opposita breviter petiolata membranacea, petiolo 2-3 mm. longo basi dilatato; lamina ovata vel lanceolato-ovata 2.5-4 cm. longa 1-1.5 cm. lata acute acuminata vel longiacuminata, basi obtusa vel subrotundata, supra viridis, costa inconspicua, enervia, subtus paullo pallidior costa gracili prominula aliter fere enervia; flores ut videtur lutei cymosi, cymis capituliformibus terminalibus dense multifloris sessilibus, ramis brevissimis vel nullis, inflorescentiis basi foliaceo-bracteatis, floribus sessilibus; sepala lanceolato-linearia 8 mm. longa fere ad basin distincta erecta et adpressa longe attenuata; corollæ tubus gracilis striatus 9-10 mm. longus supra ovarium paullo angustatus, abrupte in limbum expansus, lobis patentibus ovatis longe cuspidato-acuminatis 5 mm. longis; stamina ut stylus breviter exserta; capsula oblonga 7 mm. longa. Guatemala: Sabana de San Francisco, La Libertad, Department of Peten, April 4, 1933, *C. L. Lundell* 2479 (Herb. Field Mus. No. 689,484, type).

From other Central American species of *Lisianthus* this is distinguishable at once by the densely flowered, congested inflorescence.

ASCLEPIADACEÆ

Vincetoxicum campechianum sp. nov.—Herbacea volubilis, caulibus gracilibus viridibus subteretibus dense pilis pallidis patentibus pilosis, internodiis foliis longioribus; folia mediocria petiolata crasse membranacea, petiolo gracili 5-15 mm. longo breviter piloso; lamina oblongo-ovata ad late ovata 3-7 cm. longa 1-4.5 cm. lata acuta vel breviter acute acuminata basi rotundata, supra in sicco cinereo-viridis tantum ad costam nervosque adpresso-pilosula lucidula, subtus paullo pallidior glabra, costa gracili prominente, nervis lateralibus utroque latere circa 5 crassiusculis adscendentibus; inflorescentiæ umbelliformes 3-6-floræ axillares 3-5 mm. longe pedunculatæ, pedicellis crassiusculis 3-6 mm. longis puberulis; calyx 1.5-2 mm. longus, lobis ovalibus vel late ovatis apice obtusis vel rotundatis minute adpresso-pilosulis; corolla ut videtur viridis et albido-maculata extus minute hirtella 5 mm. longa, lobis late ellipticis vel subrotundatis apice rotundatis patentibus intus glabris vel tantum prope basin paullo puberulis; gynostegium pentagonum 2 mm. latum breviter crasse stipitatum, corona angusta subintegra pallida; fructus anguste lanceolatus 7.5 cm. longus fere 2 cm. latus versus apicem longe anguste attenuatus glaber, ubique lineis pallidis elevatis reticulatus, basi acutiusculus, tuberculis paucis 2-4 mm. longis carnosus conspersus. Campeche: Tuxpeña, February 7, 1932, *C. L. Lundell* 1302 (Herb. Field Mus. No. 655,179, type). Tuxpena, December 1931, *Lundell* 1098, 1106.

Noteworthy for the small green flowers. It is rather unusual to find in the herbarium complete flowering and fruiting material of any species of *Vincetoxicum*, and the plants are all too seldom collected. Apparently they remain in blossom for but a few days in a season.

Vincetoxicum grandiflorum sp. nov.—Herba (?) scandens 9-metralis caulibus teretibus densissime pilis multicellularibus longis mollibus fulvidis patentibus villosis, internodiis elongatis; folia majuscula breviter petiolata papyracea fragilia, petiolo crasso dense villosa 1 cm. longo; lamina oblonga 11-14 cm. longa 5-6.5 cm. lata breviter cuspidato-acuminata, acumine angusto attenuato, basi anguste rotundata et 3-5 mm. profunde cordata, supra in sicco viridis pilis longis setiformibus subadpressis pilosa, costa nervisque prominulis, subtus pallidior ubique dense pilis longis patentibus setoso-pilosa, costa crassiuscula elevata, nervis lateralibus utroque latere circa 6 adscendentibus tenerrimis prominulis fere rectis remote a margine arcuato-conjunctis, venulis paucis prominulis laxe reticulatis; flores umbellati inter maximos, umbellis axillaribus breviter pedunculatis paucifloris, pedicellis gracilibus usque ad 3.5 cm. longis dense setoso-pilosis; sepala lanceolato-linearita 1 cm. longa 2 mm. lata longe attenuata pilosa; corolla rotata 4.5 cm. lata fere ad medium 5-loba extus setoso-pilosa, lobis ovato-rotundatis apice rotundatis et breviter emarginatis intus præsertim versus centrum pilosa vel pilosula, conspicue reticulato-venosa, lutescens brunneo tincta; gynostegium sessile pentagonum 3 mm. latum apice planum. British Honduras: In secondary forest, Machaca, alt. 15 meters, very rare, August 12, 1933, *William A. Schipp* S575 (Herb. Field Mus. No. 683,575, type). Guatemala: Chama, Alta Verapaz, alt. 270 meters, June 15, 1920, *Harry Johnson* 249.

Noteworthy for the exceptionally large flowers, and for the copious pubescence of long soft tawny hairs occurring on almost all parts of the plant.

CONVOLVULACEÆ

Exogonium steerei sp. nov.—Herbacea volubilis, caulibus gracilibus teretibus dense argenteo-sericeis, internodiis elongatis; folia petiolata membranacea, petiolo 5-15 mm. longo sericeo; lamina oblonga, late ovalis vel late ovato-ovalis 5-9.5 cm. longa 2-6.5 cm. lata apice truncata vel late rotundata interdum levissime emarginata, breviter mucronulata, basi truncata vel rotundata, interdum acuta, integra, supra viridis sparse sericea, subtus argentea densissime pilis nitidis sericea; pedunculi axillares vulgo biflori 3-3.5 cm. longi, pedicellis gracilibus rectis glabris 1.5-2 cm. longis; sepala valde inæqualia subcoriacea ovalia vel rotundata apice subtruncata, interiora 1 cm. longa glabra; corolla ut videtur rubro-purpurea glabra 5 cm. longa infundibuliformis; stamina longiora corolla vix breviora; stylus corollæ subæqualis gracillimus glaber. Yucatan: Chichen Itza, near Xnaba cenote, June 25, 1932, *W. C. Steere* 1545 (Herb. Field Mus. No. 668,631, type). Chichen Itza, in forest near San Francisco, June 28, 1932, *Steere* 1599.

Evidently a handsome plant, the only member of its genus thus far discovered in the Yucatan Peninsula, well marked by the form of the leaves and the silvery, lustrous, silky pubescence of their lower surfaces.

Ipomœa confertiflora sp. nov.—Herbacea volubilis, caulibus gracilibus striatis sparse hirtellis, internodiis elongatis; folia mediocria longissime

petiolata membranacea, petiolo gracillimo 9-12 cm. longo glabro vel sparsissime piloso; lamina integra late cordato-ovata 8-11.5 cm. longa 7-8.5 cm. lata acuminata, basi 1-2 cm. profunde cordata, lobis basalibus late rotundatis, utrinque sparse pilis longiusculis tenerrimis pallidis subadpressis vel subpatentibus pilosa, subtus minute nigro-puncticulata, basi 9-nervia; pedunculi axillares petiolis longiores graciles 12-19 cm. longi, floribus cymosis, cymis dense 5-7-floris propter ramos brevissimos umbelliformibus, pedicellis glabris 7-9 mm. longis rectis; sepala subcoriacea inæqualia viridescens oblona vel oblongo-obovata acuta vel obtusa et cuspidato-mucronata, interioribus 7-8 mm. longis glabris, exterioribus paullo brevioribus dorso glabris vel sparse pilosis, marginibus dense pilis longis albis ciliatis; corolla rosea campanulato-infundibuliformis glabra 2.5-3 cm. longa; stamina et stylus inclusa, stylo filiformi glabro. British Honduras: Open places on river bank, Rio Grande, alt. 15 meters, February 9, 1934, *William A. Schipp* 1236 (Herb. Field Mus. No. 706,948, type).

A plant of rather ordinary appearance, with no outstanding characters unless it be the long-pedunculate, condensed, umbel-like inflorescence. I have been unable to associate it with any of the species described or reported from the general region.

SOLANACEÆ

Capsicum petenense sp. nov.—Frutex (?), ramis dichotomis quadrangulatis subtortuosis pilis longis albidis laxis villosis, internodiis brevibus; folia longe petiolata alterna vel opposita membranacea, eis paris valde inæqualibus, petiolo gracili 5-12 mm. longo villoso; lamina integra lanceolata vel oblongo-ovata 3.5-7.5 cm. longa 1.5-3 cm. lata acuta vel breviter acuminata, basi acuta abrupte contracta atque decurrens, supra in sicco flaventi-viridis glabra vel tantum ad nervos sparse breviter villosula, subtus fere concolor ad nervos sparse villosa vel glabrata; flores ad axillas solitarii 1 cm. longe pedicellati recurvi vel reflexi, pedicello glabro; calyx viridis campanulatus 4 mm. latus et fere æquilongus truncatus glaber, extus ad marginem dentibus 5 triangularibus 1 mm. longis onustus; corolla alba glabra 12-13 mm. longa profunde lobata, lobis oblongo-ovatis patentibus obtusis marginibus minute serrulatis; filamenta 4 mm. longa, antheris ovalibus 2.5 mm. longis obtusis rimis longitudinalibus dehiscentibus. Guatemala: Occupied clearing, La Libertad, Department of Peten, June 1933, *C. L. Lundell* 3754 (Herb. Field Mus. No. 685,329, type).

Of the alliance of *Capsicum macrophyllum* (HBK.) Standl., a species with larger broader leaves and smaller, very numerous flowers.

Capsicum viscidum sp. nov.—Frutex (?) 2.5-3.5 m. altus ramosus, ramis crassiusculis flexuosis densissime pilis elongatis viscidis patentibus mollibus villosis; folia alterna, alterna minora, magna membranacea longipetiolata, petiolis gracilibus majorum usque ad 6 cm. longis dense viscido-villosis; lamina foliorum majorum rotundato-ovata 11.5-13.5 cm. longa 8-9 cm. lata, minorum fere duplo minor, abrupte acuminata, basi valde obliqua profunde cordata plus minusve undulata utrinque dense molliterque viscido-villosa; flores ad axillas fasciculati 4-7, pedicellis gracilibus 2 cm. longis rectis vel curvis dense villosis; calyx sub baccam persistens late campanulatus extus densissime viscido-villosus 7-10 mm. longus viridis, lobis tubo plane brevioribus ovato-triangularibus acutiusculis erectis; corolla sordide purpurea extus sparse pilosa fere 2 cm. lata profunde lobata, lobis patentibus ovali-

ovatis acutiusculis; antheræ erectæ ovoideæ fere 2 mm. longæ; stylus crassiusculus antheris longior glaber; bacca glabra rubra, seminibus numerosis grosse punctatis. Guatemala: Uaxactun, Department of Peten, April 22, 1931, *H. H. Bartlett* 12690 (Herb. Field Mus. No. 652,469, type).

A relative of *Capsicum macrophyllum* (HBK.) Standl., a representative of a group of the genus whose members have little habitual resemblance to the common cultivated *Capsicum* species. From all its close relatives the Guatemalan plant is separated definitely by the copious pubescence of long soft viscid hairs.

Solanum limitaneum sp. nov.—Frutex scandens inermis 10-metralis, caule 2.5 cm. diam., ramis crassis teretibus tomento brevi densissimo stellato brunneo indutis, internodiis elongatis; folia alterna mediocria petiolata crasse papyracea fragilia, petiolo 1.5-2.5 cm. longo crassiusculo dense tomentoso; lamina oblongo-ovata integrâ 13-15.5 cm. longa 6.5 cm. lata longiuscule acute acuminata basi subæquali rotundata, supra in sicco fusca lucida dense pilis stellatis sessilibus minutis et aliis stellatis breviter stipitatis conspersa, costa nervisque non elevatis, subtus luteo-brunnescens tomento stellato submolli brevi oblecta, costa crassiuscula elevata, nervis lateralibus utroque latere circa 6 angulo semirecto vel paullo latiore adscendentibus arcuatis, venulis prominentibus laxè reticulatis; flores oppositifolii fasciculati et pauci vel cymoso-umbellati, cymis 3-5-floris 1.5-3 cm. longe pedunculatis, pedunculis crassissimis, pedicellis valde incrassatis 1.5-2 cm. longis subrectis; calyx in statu fructifero latissime campanulatus extus dense brunneo-tomentosus 1.5 cm. fere latus brevissime crenatolobatus; bacca lutea globosa 1.5 cm. diam. glabra; semina numerosa disciformia orbicularia 3-3.5 mm. lata. British Honduras: In forest, Camp 33, British Honduras-Guatemala boundary, alt. 650 meters, April 24, 1934, *William A. Schipp* S681 (Herb. Field Mus. No. 733,642, type).

Apparently a well-marked species, in habit similar to various other species of Central America, but not referable to any of those of which I have seen material.

Solanum schippii sp. nov.—Frutex metralis inermis præter inflorescentias omnino glaber, caule viridi lenticellis pallidis elevatis consperso; folia alterna majuscula breviter petiolata membranacea, petiolo crasso 1-2 cm. longo supra marginato; lamina obovata vel obovato-elliptica 15-25 cm. longa 8-11 cm. lata acuta basi acuminata et ad petiolum decurrens, integra vel paullo undulata, supra in sicco pallide viridis, costa nervisque non elevatis, subtus fere concolor, costa crassa elevata, nervis lateralibus utroque latere circa 8 angulo semirecto adscendentibus subarcuatis prominentibus prope marginem arcuato-conjunctis, venulis prominentibus laxè reticulatis; inflorescentiæ oppositifoliæ cymosæ densissime multifloræ adscendentes 2-3 cm. longe pedunculatæ basi breviter bifidæ, ramis valde adscendentibus sparse puberulis crassis, floribus secundis, pedicellis crassiusculis 7-10 mm. longis striatis supra paullo incrassatis sparse puberulis rectis vel subcurvis; calyx 3.5 mm. longus fere ad medium lobatus, lobis ovato-rotundatis apice brevissime apiculatis, sparse sordido-puberulus; corolla alba 5-6 mm. longa profunde lobata extus glabra, lobis oblongis obtusis minute villosula-ciliatis; antheræ anguste oblongæ 4.5 mm. longæ apice subtruncatæ; bacca globosa glabra 8 mm. diam. apice umbonata. British Honduras: In open forest, Machaca, alt. 15 meters, August 26, 1933, *William A. Schipp* S584 (Herb. Field Mus. No. 683,596, type). Punta Gorda region, in 1933, *Schipp* 1221.

BIGNONIACEÆ

Saldanhæa costaricensis Kränzl. Repert. Sp. Nov., 17, 1921—Based upon *Tonduz* 13929 from Nicoya, Costa Rica, and the only species of the genus known from North America, the others being South American. Three recent collections extend the known range of the species far northward: Guatemala: El Paso, Peten, April, 1932, *Lundell* 1554. Chimah, Peten, *Lundell* 3436; a large vine. British Honduras: Corozal District, a woody vine, the seeds or capsules known as "duppy beans," *Gentle* 397. The corollas appear to be purple or pink.

Cuspidaria pterocarpa (Cham.) DC.—The genus *Cuspidaria* is one of the small groups of the Bignoniaceæ, consisting of a few species that are all or chiefly Brazilian. A recent collection from Guatemala is the first record of *Cuspidaria* for North America. The specimen is in fruit only, and, so far as the material indicates, it is referable to *C. pterocarpa* of Brazil and Paraguay, although it is possible that flowers may show distinguishing characters upon which to base a separate species. The genus is easily recognized by the elongate capsule with broad longitudinal wings. Guatemala: Fallabon-Yaxha Road, Peten, March 1933, *C. L. Lundell* 2193.

Clytostoma elegans sp. nov.—Frutex scandens 12-metralis, trunco 3.5 cm. diam., ramis gracilibus tetragonis 2 mm. tantum crassis ochraceis sparse lenticellatis puberulis vel glabratibus; phylla stipulas simulantia ut videtur parva, perfecta non visa; folia breviter petiolata bifoliolata, petiolo crasso 5-8 mm. longo, cirrhis elongatis gracilibus; foliola papyracea 1 cm. longe petiolulata anguste lanceolato-oblonga circa 12 cm. longa et 4 cm. lata longiacuminata, acumine obtuso vel acuto, basi obtusa, supra in sicco obscure viridia glabra vel tantum ad costam minute puberula, costa nervisque prominulis, venulis prominulis, subtus pallidiora lucida glabra, costa gracili elevata, nervis lateralibus utroque latere circa 6 angulo fere recto adscendentibus prominentibus valde arcuatis, venulis prominentibus reticulatis; flores ad apicem rami inserti 4 graciliter 2-2.5 cm. longe pedicellati, pedicellis sparse et minutissime puberulis; calyx campanulatus 7-8 mm. longus glaber vel glabratus basi rotundatus truncatus, margine dentibus subulatis 1.5-2 mm. longis erectis onusto; corolla rosea 6-7.5 cm. longa extus subsparse breviter villosula, tubo superne sensim ampliata fauce fere 2 cm. lato, lobis late rotundatis 1.5-2 cm. longis. British Honduras: River bank, Rio Grande, alt. 75 meters, common, March 10, 1933, *William A. Schipp* 1127 (Herb. Field Mus. No. 669,152, type).

The only species of *Clytostoma* reported previously from Central America is *C. isthmicum* Pittier, of Panama. In that the flowers are somewhat smaller, the corolla glabrous or merely sparsely lepidote outside, the calyx smaller and with much shorter teeth, and the leaflets acute at the base.

Clytostoma mayanum sp. nov.—Frutex scandens, ramis acute quadrangulatis 3-5 mm. crassis striatis, novellis sparse minute lepidotis; phylla stipulas simulantia minuta angusta; folia bifoliolata petiolata, petiolo 0.7-1.5 cm. longo, cirrhis elongatis gracilibus; foliola papyracea 8-12 mm. longe petiolulata elliptica, oblongo-elliptica vel obovato-elliptica 7-10 cm. longa 3-5.5 cm. lata abrupte breviter acuminata, acumine lato acuto, basi anguste vel late rotundata vel interdum obtusa, sæpe plus minusve obliqua, supra in sicco fusca glabra vel sparsissime minute lepidota, costa nervisque promi-

nentibus, venulis prominulis reticulatis, subtus fere concoloria ad costam nervosque sparse breviter pilosa, costa gracili elevata, nervis lateralibus utroque latere circa 6 angulo semirecto adscendentibus tenerrimis leviter arcuatis, venulis vix prominulis laxè reticulatis; flores ad apicem rami umbellato-fasciculati vel interdum umbellati, umbella breviter pedunculata, inflorescentiis 2-5-floris, pedicellis 5-8 mm. longis glabris; calyx campanulatus basi late rotundatus 5 mm. longus glaber, margine ciliato, truncatus et remote denticulatus, dentibus vix 0.3 mm. longis erectis; corolla ut videtur rosea 5-5.5 cm. longa extus sparse minute lepidota, tubo superne sensim dilatato fauce 1.3 cm. lato, lobis patentibus rotundatis 1.5-2 cm. longis; stamina tubo corollæ duplo breviora, filamentis gracilibus glabris, loculis antherarum oblongis 3 mm. longis; stylus antheris æquilongus gracilis glaber. Guatemala: Yaxha-Remate Road, Department of Peten, June 17, 1933, *C. L. Lundell* 4008 (Herb. Field Mus. No. 685,324, type). Ixlu, Lake Peten, June 15, 1933, *Lundell* 4007. British Honduras: High ridge, Corozal District, 1931-32, *Percy H. Gentle* 441.

From *Clytostoma elegans* this is distinguished by its broad leaflets, smaller flowers, and minutely denticulate calyx; from *C. isthmicum* by the broader leaflets, rounded at the base and abruptly short-acuminate at the apex.

Tynnanthus hyacinthinus sp. nov.—Frutex scandens 18-metralis, trunco 7 cm. diam., ramis acute tetragonis, novellis olivaceis glabris, internodiis elongatis; phylla stipulas simulantia foliacea ovata vel rotundata usque ad 1 cm. longa; folia bifoliolata longe petiolata, cirrhis elongatis gracilibus, petiolo 3.5-8 cm. longo glabro; foliola late ovata ad elliptica vel oblongo-ovata 8-16 cm. longa 5-8 cm. lata acuta vel breviter acuminata basi truncata vel rotundata firme membranacea glabra, supra in sicco fusco-viridia lucida, subtus concoloria, costa gracili elevata, nervis lateralibus utroque latere circa 4 angulo recto adscendentibus; flores cymoso-paniculati, paniculis terminalibus laxè vel dense multifloris sessilibus vel paniculatis, pedicellis 2-3 mm. longis, bracteis bracteolisque diutius persistentibus linearibus vel subulatis parvis, ramis gracilibus glabris; calyx late campanulatus 2.5-3 mm. latus 1.5 mm. altus truncatus vel interdum breviter bilobus; corolla purpurea 1.5 cm. longa extus dense glandulis minutis ferrugineis conspersa, conspicue bilabiata, tubo crasso supra basin subabrupte expanso, lateribus convexis, labio superiore suberecto bilobo, inferiore trilobo patente paullo longiore; stamina inclusa, filamentis filiformibus glabris, thecis antheræ divaricatis; ovarium oblongum acutum glabrum, stylo filiformi glabro, stigmatibus lanceolatis acutis, disco obsoleto. British Honduras: On creek banks, Jacinto Creek, alt. 15 meters, April 28, 1934, *William A. Schipp* S661 (Herb. Field Mus. No. 733,483, type). In forest, Camp 33, British Honduras-Guatemala boundary, alt. 840 meters, April 1934, *Schipp* 1241.

From Central America only one other species of the genus has been reported, *Tynnanthus guatemalensis* Donn. Smith, in which the leaflets are acute at the base and the ovary hirsute. In the type specimen cited above for *T. hyacinthinus* the flowers are described as purple and the calyx is broad and entire. In the second collection listed the flowers are described as yellow streaked with brown and the calyx is conspicuously bilobate. The differences in the calyces, all of which are uniform on each plant, are rather conspicuous, but since the two specimens are alike in every other character, particularly in the form and peculiar indument of the corolla, there can be

little if any doubt that a single species is represented. I suspect that the color of the corolla is described incorrectly in the case of the second collection.

ACANTHACEÆ

Beloperone crenata sp. nov.—Frutex 2-metralis, trunco 2.5 cm. diam., ramis viridibus teretibus lævibus anguste bifariam puberulis et ad nodos densius puberulis, infra nodos in sicco constrictis, internodiis brevibus vel elongatis; folia magna membranacea petiolata, petiolo 1-2 cm. longo crassiusculo breviter piloso vel glabrato submarginato supra canaliculato; lamina oblonga vel lanceolato-oblonga 14-26 cm. longa 4.5-8 cm. lata sensim vel abrupte acuminata vel longiacuminata, basi acuta, interdum basin versus longe angustata, versus apicem vel in toto margine crenata, supra in sicco intense viridis glabra densissime cystolithis minutis linearibus conspersa, subtus fere concolor sparse ad costam adpresso-pilosula vel glabra, densius cystolithis conspersa, costa gracili elevata, nervis lateralibus utroque latere circa 11 angulo lato adscendentibus arcuatis; inflorescencia terminalis dense multiflora thyrsoformi-paniculata sessilis vel pedunculata 5-13 cm. longa, ramis paucis vel numerosis erectis bracteis dense imbricatis occultis, bracteis ovalibus et apice rotundatis vel oblongo-ovatis et acutis vel acuminatis dense albido-ciliatis, dorso sparse pilosis viridibus adpressis; sepala viridia erecta oblongo-lanceolata acuminata dorso glabra vel sparse breviter pilosula ciliata; corolla lutea 5-6 cm. longa angusta extus laxe pilosa tubo gracili supra vix dilatato fauce 5 mm. lato, labio postico erecto 1 cm. longo attenuato, inferiore æquilongo subpatente; stamina corollæ æquilonga, antheris inæqualiter insertis 2.5 mm. longis basi breviter obtuse calcaratis; ovarium sessile glabrum. British Honduras: In forest, Pueblo Viejo, alt. 510 meters, February 18, 1934, *William A. Schipp* S694 (Herb. Field Mus. No. 733,494, type). Toledo District, January 1929, *Neil S. Stevenson* 82, 90.

The plant is not similar in general appearance to any species of *Beloperone* known from Central America, although it resembles some of those found in the West Indies and South America. In aspect, particularly the size and color of flowers, it is much like *Jacobinia umbrosa* (Benth.) Blake, a common weed, but a very handsome one, of the Atlantic coast of Central America.

Justicia campechiana sp. nov.—Ut videtur suffrutex, 40 cm. altus et ultra, ramosus, ramis teretibus viridibus glabris, internodiis elongatis supra nodos in sicco constrictis, ad nodos hirtellis, novellis interdum sparse bifariam hirtellis; folia petiolata membranacea, petiolo gracili 4-8 mm. longo interdum ciliato; lamina lanceolata vel oblongo-ovata 3.5-8.5 cm. longa 1.2-3 cm. lata acuminata basi acuta et interdum longe decurrens, integra, glabra, utrinque dense cystolithis brevibus linearibus conspersa, supra in sicco viridis, costa nervisque pallidis non elevatis, subtus paullo pallidior, costa gracili elevata, nervis lateralibus utroque latere circa 7 adscendentibus arcuatis; flores parvi spicati, spicis axillaribus simplicibus vel trifurcatis foliis duplo brevioribus breviter pedunculatis dense paucifloris, rhachi sparse pallido-puberula, bracteis linearibus viridibus 1.5 mm. longis adpressis, floribus sessilibus et subadpressis; sepala lanceolato-lineararia viridia 5-6 mm. longa attenuata erecta glabra; corolla 10-11 mm. longa extus sparse breviter pilosa, tubo superne sensim dilatato fauce 3 mm. lato, labio superiore erecto apice breviter bilobo, inferiore patente subæquilongo apice breviter lobato;

stamina 2, antheræ loculis inæqualiter insertis ovalibus 1 mm. longis basi muticis. Campeche: Monterrey, a frequent weed, December 25, 1931, *C. L. Lundell* 1126 (Herb. Field Mus. No. 652,213, type).

Ruellia pereducta sp. nov.—Herba ramosa fere omnino glabra, caulibus gracilibus teretibus, internodiis elongatis; folia majuscula longissime petiolata crasse membranacea in sicco cinereo-viridia, petiolo gracillimo foliorum majorum 6.5-9.5 cm. longo glabro; lamina ovata vel ovato-oblonga 8-14 cm. longa 2.5-6 cm. lata sensim vel subabrupte longissime acuminata, basi plus minusve obliqua obtusa vel rotundata utrinque cystolithis numerosissimis minutis linearibus densissime conspersa integra; flores solitarii vel geminati pedunculos terminales vel axillares terminantes, pedicello crasso 1.5-2 mm. longo glabro, bracteis rigidis erectis linearibus 3 mm. longis; calyx 6-8 mm. longus fere ad basin 5-lobatus, laciniis lanceolato-linearibus longissime attenuatis ciliolatis glabris; ovarium angustum glabrum ad stylum filiforme glabrum sensim attenuatum; corolla ut videtur purpurea extus glabra, tubo arcuato, parte inferiore 1 cm. longa 1.5 mm. lata abrupte in faucem supra dilatatum 2 cm. longum ore 8 mm. latum dilatata, lobis 5 subæqualibus rotundato-ovalibus 8 mm. longis et fere æquilatis apice late rotundatis vel emarginatis; antheræ oblongo-lineares 2-2.2 mm. longæ breviter exsertæ. Mexico: Monterrey, Campeche, January 23, 1932, *C. L. Lundell* 1239 (Herb. Field Mus. No. 655,176, type).

The abnormally long and slender petioles are a character by which this striking plant may be recognized without difficulty.

Stenandrium dulce (Cav.) Nees—The genus *Stenandrium* is represented in Mexico by at least three species, one of which, *S. subcordatum*, was described by the writer from Yucatan. So far as I know, the genus has not been recorded from Central America, but the following collections may now be reported for *S. dulce*: Guatemala: Chiche, Peten, June 1933, *Lundell* 3707. La Libertad, June 1933, *Lundell* 3626.

RUBIACEÆ

Alseis yucatanensis Standl. Field Mus. Pub. Bot., 8, 50, 1930.—Originally described from Yucatan, this tree, the most northern representative of a genus that extends far southward in South America, has been collected more recently at various localities in British Honduras and Guatemala. The following collections may be recorded: Yucatan: Without locality, in dark forests, flowers brownish yellow, *J. Linden* (Herb. Paris). British Honduras: Forest Home, Toledo, a tree of 18 meters, the trunk 45 cm. in diameter, *Schipp* 1053. Machaca, a tree of 10 meters with trunk diameter of 12 cm., *Schipp* 1230. San Jose, northwestern Cayo District, called "wild mamee," *J. B. Aitken* 3. Guatemala: Chimah, Peten, *Lundell* 3434. Monte Polol, Peten, *Lundell* 3758; a tree of 30 meters, found chiefly in secondary forest; called "dzon."

Cephalanthus occidentalis L.—This common shrub of the eastern half of the United States is infrequent in Mexico, and in Central America it has been recorded only from the mountains of central Honduras, where it was collected in 1932 by J. B. Edwards. It may now be reported for one more of the Central American countries: British Honduras: Maskall, March 10, 1934, *Percy H. Gentle* 1254.

Diodia brasiliensis Spreng. var. *angulata* (Benth.) comb. nov.—*Triodon angulatum* Benth. Pl. Hartw., 70, 1840. *Diodia polymorpha* Cham. & Schlecht. var. *angulata* Schum. in Mart. Fl. Bras., 6, pt. 6, 13, 1888. As pointed out long ago by Schumann, the plant of Mexico and northern Central America upon which the genus *Triodon* was based is nothing more than a geographic form of the common *Doidia brasiliensis* of South America. The plant affords a remarkable case of discontinuous distribution, for the Brazilian and Mexican forms are so similar that if they were both found in the same area, differences between them would be difficult to find.

Faramea belizensis sp. nov.—Omnino glabra, ramis gracilibus ochraceo-olivaceis lævibus obtuse tetragonis, internodiis valde elongatis; stipulæ 5-8 mm. longæ persistentes ad medium connatæ arcte adpressæ, parte libera oblongo-ovata acuta et brevissime mucronata; folia breviter petiolata chartacea, petiolo circa 1 cm. longo; lamina ovata, ovato-elliptica vel oblonga circa 14 cm. longa et 4-7.5 cm. lata apice acuta vel subobtusata et caudata, acumine lineari 1 cm. longo obtuso, basi obtusa vel acuta, supra in sicco fusca, costa, nervis venulisque omnibus prominentibus, opaca, subtus brunnescens, costa gracili elevata, nervis lateralibus utroque latere circa 13 angulo latiusculo adscendentibus tenuibus prominentibus fere rectis prope marginem in nervum distinctum collectivum undulatum conjunctis, nervulis prominulis arcte reticulatis; inflorescentia cymoso-umbellata multiflora 5 cm. longa 7 cm. lata 4.5-5.5 cm. longe pedunculata erecta basi umbellatim 5-ramosa, ramis primariis 2.5 cm. longis rectis angulatis, floribus in cymulas trifloras dispositis, pedicellis 3-5 mm. longis crassis; hypanthium obovodeum 1.5 mm. longum; calyx tubuloso-campanulatus 3-5 mm. longus truncatus; corolla in alabastro anguste attenuata, tubo crassulo 1 cm. longo, lobis linearibus attenuatis tubo subæquilongis. British Honduras: Without locality, in 1934, *William A. Schipp* S721 (Herb. Field Mus. No. 733,535, type).

Faramea occidentalis (L.) Rich., similar in general appearance, differs in its sessile inflorescence and broader, distinct, long-mucronate stipules.

Hoffmannia rhizantha sp. nov.—Suffrutex circa 60 cm. altus glaber simplex, caule crasso paucifoliato obtuse tetragono; stipulæ non visæ; folia maxima petiolata firme membranacea, petiolo 3-6 cm. longo supra alato versus basin anguste marginato; lamina oblongo-obovata 23-32 cm. longa 10-12.5 cm. lata subabrupte acute acuminata, circa basin subabrupte angustata dein longissime sensim attenuata, supra in sicco obscure viridis, costa nervisque non elevatis, subtus pallidior, costa crassa prominente, nervis lateralibus utroque latere circa 14 angulo fere recto adscendentibus arcuatis tenuibus prominulis prope marginem arcuato-conjunctis, venulis paucis laxè reticulatis prominulis; inflorescentia parva laxè pauciflora ad basin ipsam caulis nascens sessilis e basi ramosa 4 cm. longa, floribus pedicellatis; hypanthium anguste oblongum versus basin attenuatum 3-5 mm. longum; calyx profunde dentatus, dentibus erectis lanceolato-oblongis acuminatis; corolla rubra glabra 5-6 mm. longa fere ad basin lobata in alabastro attenuata, lobis oblongo-linearibus acuminatis. British Honduras: In forest along creek bank, Esperanza trail, alt. 630 meters, June 26, 1934, *William A. Schipp* S731 (Herb. Field Mus. No. 729,968, type).

This plant is extraordinary because of the fact that the inflorescence arises from the very base of the stem at the surface of the soil. No other known species of *Hoffmannia* has a similar flowering habit.

Psychotria fruticetorum Standl. Jour. Arnold Arb., 11, 42, 1930—The species was based upon a collection from the mountains of central Honduras, and no other material was available when the description was published. Strangely enough, immediately afterward the same plant appeared in numerous collections received by the writer for determination, and it is evident that it has a rather wide distribution, as indicated by the following specimens in the herbarium of Field Museum. Campeche: Tuxpeña, in 1931, *Lundell* 1062. Guatemala (Department of Peten): Santa Cruz, *Bartlett* 12397; San Clemente to Dos Arroyos, *Bartlett* 12835, 12824, 12819; Yaxha-Remate Road, *Lundell* 4252. British Honduras: Mountain Pine Ridge, El Cayo District, *Bartlett* 11622; Little Mountain Pine Ridge, El Cayo District, *Bartlett* 11869; Duck Run, El Cayo District, *Bartlett* 13122; without locality, in 1926, *H. W. Winzerling* V-1; Honey Camp, Orange Walk, *Lundell* 133, 310, 617; San Antonio, Corozal, *Lundell* 4849; Corozal-Pachacan Road, *Lundell* 4914; Isabella Pine Ridge, *Lundell* 4243; Big Fall Pine Ridge, *Lundell* 4191; Mullins River Road, *Schipp* 204; Camp 36, British Honduras-Guatemala boundary, alt. 840 meters, *Schipp* S714; Corozal District, *Gentle* 440; San Antonio, Corozal, *Gentle* 59; Maskall, *Gentle* 1188, 946; Manatee Pine Ridge, Belize District, *Gentle* 114; Corozal-Pachacan Road, *Gentle* 837. The plant is described as attaining sometimes a height of 1.5 meters, but usually it is substantially smaller.

Rondeletia belizensis sp. nov.—Arbor 6-metralis vel frutex, ramis teretibus griseis vel ferruginosis sparse lenticellis albidis conspersis, novellis minute puberulis; stipulæ anguste triangulares subpersistentes acutæ 1.5-2 mm. longæ; folia petiolata subcoriacea, petiolo 5-8 mm. longo minute puberulo; lamina ovata vel oblongo-ovata 3-7 cm. longa 1.5-4.5 cm. lata acuta vel subobtusa, apice ipso obtuso, basi obtusa vel acutata interdum subrotundata, glabra, supra in sicco læte viridis vel flaveni-viridis, costa anguste impressa, nervis venulisque non elevatis, subtus fere concolor, in axillis nervorum minute domatiata, costa gracili elevata, nervis lateralibus utroque latere circa 5 angulo latiusculo adscendentibus subarcuatis, venulis obscuris non elevatis; inflorescentia terminalis cymoso-corymbosa dense multiflora pedunculata vel sessilis usque ad 5 cm. longa sed sæpius reducta et capituliformis, bracteis linearibus parvis, pedicellis usque ad 2 mm. longis vel nullis; hypanthium subglobosum densissime albido-puberulum; sepala 4 linearia erecta 1.5-2 mm. longa obtusa; corolla ut videtur alba extus dense pilis minutis albidis adscendentibus pilosula, tubo gracili 7-9 mm. longo supra vix dilatato fauce glabro lutescente, lobis 4 patentibus late rotundatis vix ultra 2 mm. longis intus villosulis; capsula subglobosa brunnescens 6 mm. lata densiuscule scaberulo-puberula sepalis persistentibus coronata; semina numerosa late alata. British Honduras: In forest on hill top, Jacinto Hills, alt. 90 meters, August 28, 1933, *William A. Schipp* 1201 (Herb. Field Mus. No. 683,600, type). Guatemala: La Libertad, Department of Peten, April and May 1933, *C. L. Lundell* 3210, 2854, 3352; *Mercedes Aguilar* 28. Lake Peten, May 1933, *Lundell* 3188.

Rather similar to *Rondeletia panamensis* DC., which, however, has 5-parted flowers, longer calyx lobes, and appressed-pilose leaves.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

V

RUSTS AND SMUTS FROM THE YUCATAN PENINSULA

By E. B. MAINS

[Issued November 26, 1935.]

RUSTS AND SMUTS FROM THE YUCATAN PENINSULA ¹

The collections discussed in the following pages have been obtained by three expeditions of the University of Michigan and the Carnegie Institution of Washington, to the Yucatan Peninsula, for the purpose of making a biological survey of the Maya area. In the botanical study, attention has been devoted thus far largely to phanerogams. However, a number of collections of fungi were obtained and among these were specimens of rusts and smuts. These are specially interesting since they were collected from areas difficult of access and about which little is known mycologically.

On the expedition in 1931, H. H. Bartlett collected in British Honduras, especially in the area known as the Mountain Pine Ridge, along the Belize River, and in the region surrounding Uaxactun in Petén, Guatemala. In 1932, W. C. Steere and J. R. Swallen spent most of their time in the state of Yucatan, particularly in the vicinity of Chichen Itza. Some collections were also made in the northern portion of the state of Campeche. In 1933, C. L. Lundell collected in British Honduras and in the Department of Petén, Guatemala with headquarters at La Libertad. In addition, several specimens of rust were obtained from phanerogamic specimens of other collectors in the peninsula. In all cases where rusts were obtained from phanerogamic specimens, the letter A has been added to the collector's number.

Although the number of species (32) is not large, the proportion of new or unusual species is surprising. Nine have not been described previously. *Chaconia alutacea* is of no less interest. Apparently this species has formerly been known only from the type collected in Paraguay in 1893. The collections of *Dasyscypha gregaria* furnish additional material of a relatively rare species. Of the smuts, *Thecaphora haumani* has apparently been known previously only from the type locality in Argentina.

UREDINALES

Cerotelium fici (Cast.) Arth. II. On *Ficus involuta* (Liebm.) Miq. Tuxpeña, Campeche, Mexico, January 19, 1932. C. L. Lundell (1727). This is a common rust of *Ficus*. Apparently *F. involuta* has not been reported previously as a host.

Chaconia alutacea Juel. This rust was found on a phanerogamic specimen in the Herbarium of the University of Michigan. The specimen was labeled *Pithecolobium recordii* (Britt. & Rose) Standl. but is obviously not that species but apparently *P. peckii* (Rob.) Standl.

Juel (Bihang K. Svenska Vel. Akad. Handl., 23, 12-15, 1897) described the genus *Chaconia* and the species *C. alutacea* from a collection made by

¹Papers of the Botany Department and the University Herbarium, University of Michigan, No. 497.

C. A. M. Lindman, July 15, 1893, near Asuncion, Gran Chaco, Paraguay. The host is given as *Calliandra*, "ohne Zweifel *C. harrisii* (Lindl.) Benth." *Chaonia alutacea* was distributed by Vestergren (Microm. rar. sel. 755) and the host given as *Phithecolobium divaricatum* (Borg.) Benth. with the statement that it had been erroneously determined earlier as *Calliandra*. Juel described only telia. Apparently the species hitherto has been known only from the type collection.

Both pycnia and uredinia occur sparingly on the specimen from British Honduras. They are somewhat old and difficult to study. The pycnia are subcuticular and lenticular. It was not possible to definitely determine the method of formation of the urediniospores. They probably occur singly. No pedicels are noted. The telia are grouped about the pycnia and uredinia or less frequently are alone in small groups. A comparison with portions of the type, which were kindly loaned from the Farlow and Arthur Herbaria, shows the same curious development of the teliospores. They are produced in fascicles of 2 to 10 or more and apparently develop by the successive lateral budding of a basal cell or two or more branches of such a cell. The buds are soon cut off from the basal cell by a septum. The older cells may be pushed to one side by the next bud formed. In some cases at least, the older cells remain at the apex and the new buds form lateral spores. Soon after the teliospore reaches its maximum size, it develops a typical basidium by the prolongation of the apex into a tube 50 to 60 μ long by 10 μ in diameter, which divides into four cells from each of which a sterigma and basidiospore is produced.

The following description is based on the type and the collection from British Honduras.

Pycnia amphigenous, lenticular, 20 to 24 by 60 to 70 μ , subcuticular. Uredinia hypophyllous, few, sub-epidermal, closely associated with pycnia, 0.5 to 1 mm. in diameter; urediniospores ellipsoid, 16 to 20 by 22 to 26 μ ; wall cinnamon-brown, about 2 μ thick, moderately echinulate, the pores obscure. Telia hypophyllous, white, small, aggregated in spots 2 to 3 mm. in diameter, ruptured epidermis conspicuous; teliospores arising as 2 to 10 branches from a common basal cell, cylindric, 10 to 18 by 40 to 70 μ , wall thin, 0.5 μ , uniform in thickness, germinating at once by elongation of the spore into a basidium.

On *Pithecolobium* (*peckii*?), Sittee River, British Honduras, Sept. 4, 1930, W. A. Schipp (621A).

The position of this rust is uncertain. The Sydows and Arthur have placed the genus in the Melampsoraceæ. Dietel has recently included it along with *Calidion*, *Olivea*, *Chrysocelis* and *Goplana* in the Pucciniaceæ. The teliospores are not laterally united. They, however, do not have well-differentiated pedicels. Although the uredinia studied were too old for critical study, the urediniospores apparently are sessile, a condition more commonly found in the Melampsoraceæ.

Sphærophragmium fimbriatum n. sp. urediniis minutis, 0.1-0.2 mm. longis, hypophyllis, fulvis, pulverulentis; paraphysibus copiosis ad marginem cingentibus, subflavis, cylindricis, inflexis, 9-11 x 40-70 μ , plus minusve ramosis, inferne conjugatibus, medio septatis, membrana inæqualite spissatis, supremis cellulis saepe solidis; urediniosporis obovoideis, 16-20 x 28-38 μ , membranis subbrunneis, 1-1.5 μ crassis, ad apicem saepe spissatis, 2-7 μ , echinulatis; poris germinationis 4(5-6), aequatorialibus; teliis atribunneis, pulverulentis; paraphysibus copiosis; teliosporis subglobosis, 28-40

x 34-44 μ , ex 8 cellulis compositis, membranis castaneobrunneis, 2 μ crassis; pedicellis 60-100 μ longis. Pl. 3, C.

In foliis *Dalbergiae glabrae*. Legit H. H. Bartlett, Uaxactun, Petén, Guatemala, April 1, 1931 (12429A, specimen typicum). In Herbario Universitatis Michiganensis conservatum.

II. Uredinia hypophyllous, small 0.1 to 0.2 mm. long, cinnamon-brown, pulverulent; paraphyses peripheral, pale yellow, cylindric incurved, 9 to 11 by 40 to 70 μ , more or less branched, united below, uniseptate, the wall irregularly thickened, upper cell often solid; urediniospores obovoid, 16 to 20 by 28 to 38 μ , pale brown, the wall 1 to 1.5 μ , often thickened above, 2 to 7 μ , sparsely echinulate, the pores usually 4, occasionally 5 or 6, equatorial.

III. Telia hypophyllous, small 0.1 to 0.2 mm. in diameter, chocolate-brown, finally pulverulent, paraphyses as in uredinia; teliospores irregularly globoid, 28 to 40 by 34 to 44 μ , usually 8-celled, each cell bearing several projections 6 to 10 μ long, stellately branched at apex, the wall chestnut-brown, 2 μ ; pedicels 60 to 100 μ long.

On *Dalbergia glabra* (Mill.) Standl. Uaxactun, Petén, Guatemala, April 1, 1931, H. H. Bartlett (12429A, type); *Dalbergia* sp. Volcan Mombacho, Nicaragua, Feb. 10, 1903, C. F. Baker (154A).

This very interesting species resembles *Sphaerophragmium dalbergiae* Dietel, which has been reported on species of *Dalbergia* from Africa, India and Cuba. *S. dalbergiae*, however, has two superequatorial pores in the urediniospore. The urediniospores are somewhat smaller than those of *S. fimbriatum* and the wall of uniform thickness. The pedicels of the teliospores are also somewhat shorter.

Uredo nidulans Syd. was described from a specimen of *Dalbergia foliosa* collected in Bolivia. A comparison with this rust was made possible through the discovery of the rust on a phanerogamic specimen in the Parke-Davis Herbarium recently given to the University of Michigan. This was on *Dalbergia foliosa* collected by Miquel Bang (1408) at Guanæ-Tipuaní, Bolivia, April-June 1892. Apparently it is a specimen from the same collection from which the Sydows (Ann. Mycol., vol 1, 332, 1903) described the rust. It has smaller urediniospores than *S. fimbriatum* and wall uniform in thickness. Although the walls of the paraphyses are irregularly thickened, they never fill the upper cell. In this the paraphyses of *S. fimbriatum* are unique. They encircle the uredinia, arising from a pseudoperidium below and may branch several times. The final branch may be divided by a septum. The walls are very irregularly thickened. In many paraphyses the thickening is so great in the upper cell that only a small channel is left. In many instances this also is closed and the upper part of the paraphysis appears solid.

The specimen from Nicaragua collected by C. F. Baker was obtained from a phanerogamic specimen in the Herbarium of the University of Michigan.

Ravenelia bifenestrata n. sp. urediniis amphigenis, ovatis vel oblongis, minutis, 0.2-0.7 mm. longis, sub-epidermalibus, fulvis, tectis cum epidermate et paraphysibus parva fissura apertis; paraphysibus multis, ad marginem cingentibus, imminetibus, inferne conjugantibus, clavaticylindricis vel subfusiformibus, 8-12 x 75-120 μ , pariete hyalino vel subflavo inferiore parte tenuissimo, 0.5 μ , ad apicem abrupte incrassato 10-20 μ ; urediniosporis fusiforme-ellipsoideis, 16-20 x 22-28 μ , echinulatis, membrana fulva, 1.5-2 μ crassa, duabus transversis hyalinis æquatorialibus oblongis, tenuissimis fenestris prædita; fenestra quaque duobus germina-

tionis poris instructa; teliis amphigenis, ovatis vel oblongis, minutis, 0.3-0.8 mm. longis, aggregatis, cum imminente epidermate partim tectis; capitulis teliosporarum 90-110 μ latis, 45-50 μ crassis, ex 23-32 sporis compositis; sporis levibus castaneo-brunneis, unicellulis; cystidis hyalinis, in aqua rapide turgentibus et erumpentibus. (Plate 1.)

In foliis *Pithecolobii platylobi*. Legit C. L. Lundell (1723), Tuxpeña, Campeche, Mexico, January 13, 1932; (1296A, specimen typicum), February 6, 1932. Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia amphigenous, gregarious in small groups, small, oval to oblong, 0.2 to 0.7 mm. long, subepidermal, cinnamon-brown, mostly covered by overarching paraphyses and epidermis except for pore or slit; paraphyses abundant, peripheral, overarching, united below, clavate-cylindric to fusiform-cylindric, 8 to 12 by 75 to 120 μ , the wall colorless or yellowish, very thin, 0.5 μ or less, abruptly thickened to 10 to 20 μ at apex; urediniospores fusiform-ellipsoid, 16 to 20 by 22 to 28 μ , the wall cinnamon-brown, 1.5 to 2 μ , except for two transverse, hyaline, equatorial, oblong, thin-walled bands, moderately echinulate, the pores four, two in each band. Telia amphigenous, oval to oblong, gregarious in small groups, small, 0.3 to 0.8 mm. long, partly covered by the overarching epidermis; teliospore-heads 90 to 110 μ broad, 45 to 50 μ thick, containing 23 to 32 one-celled spores, chestnut-brown, smooth; cysts colorless, rapidly swelling and bursting in water; pedicels inconspicuous.

On *Pithecolobium platylobum* (Speng.) Urban, Tuxpeña, Campeche, Mexico, January 13, 1932, C. L. Lundell (1723); February 6, 1932 (1296A, type).

This is a very distinct species. The urediniospores are unique on account of the occurrence of two hyaline, oblong, thin areas in the wall on opposite sides of the spore in the equatorial zone. A germ-pore occurs in each end of each band. The paraphyses also are unusual in that the thin wall abruptly thickens at the apex. The wall is 10 to 20 μ thick at the apex. The pedicels for the teliospore-heads are inconspicuous. They are very short and fragile, and the heads appear sessile. The structure and development is very different from that given for *Nothoravenelia*.

In placing this species in the genus *Ravenelia*, a generic concept similar to that described by Arthur in his Manual of Rusts of the United States and Canada is used. The restricted generic concepts employed by Sydow and Dietel would necessitate other dispositions.

***Ravenelia inconspicua* Arth. II.** On *Cæsalpinia yucatanensis* Greenm. Tuxpeña, Campeche, Mexico, February 10, 1932, C. L. Lundell (1314). Arthur has reported this species from Guatemala, Salvador and Jalisco, Mexico.

***Prospodium cydistæ* n. sp.** urediniis 0.2-0.5 mm. latis, hypophyllis, pulverulentis, fulvis; paraphysibus paucis, obscuris, hyphoideis; urediniosporis, late ellipsoideis, 26-30 x 30-36 μ , membrana laminis duabus instructa, interiore fulva, 2-2.5 μ crassa, exteriore hyalina, 1.5-4 μ crassa, moderate vel exigue et crasse echinulata; poris germinationis 2, æquatorialibus; teliis 0.2-0.8 mm. latis, hypophyllis, pulverulentis, atri-brunneis; teliosporis ellipsoideis, 27-32 x 40-46 μ ; membranis castaneo-brunneis, 4-4.5 μ crassis, æquabilibus, moderate verruculosus; pedicellis usque 92 μ longis,

subflavis, inferne 4-8, plusminusve appendices ramosas ferentibus. (Plate 2 A, B.)

In foliis *Cydistæ* sp. Legit C. L. Lundell (1618) El Paso, Petén, Guatemala, April 25, 1932. Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia hypophyllous, 0.2 to 0.5 mm. in diameter, pulverulent, cinnamon-brown; paraphyses few, inconspicuous, hyphoid, urediniospores broadly ellipsoid, 26 to 30 by 30 to 36 μ , the wall laminate, the inner wall cinnamon-brown, 2 to 2.5 μ thick, the outer, hyaline, 1.5 to 4 μ , moderately to sparsely and rather coarsely echinulate, the pores 2, equatorial. Telia hypophyllous, 0.2 to 0.8 mm. in diameter, dark chocolate-brown, pulverulent; teliospores ellipsoid, 27 to 32 by 40 to 46 μ ; wall chestnut-brown, uniform in thickness, 4 to 4.5 μ , moderately verrucose, the pedicel up to twice the length of the spore, yellowish, provided at the base with 4 to 8 more or less branched appendages.

On *Cydistæ* sp. El Paso, Petén, Guatemala, April 25, 1932, C. L. Lundell (1681).

The scanty development of paraphyses, uniformly laminate wall of the urediniospores, uniform wall of the teliospores characterize this species.

Uromyces costaricensis Syd. II. On *Lasiacis ruscifolia* (H.B.K.) Hitchc. Chichen Itza, Yucatan, Mexico, July 7-13, 1932, J. R. Swallen (2397); II Tancah, Yucatan, (Quintana Roo) Mexico, Aug. 4-5, 1932, J. R. Swallen (2817½). Thurston (Mycologia, vol. 25, 442-445, 1933.) has recently shown that collections of rust on species of *Lasiacis* belong to *Uromyces costaricensis* rather than *Uromyces leptodermus* Syd. Similar conclusions have been reached by a comparison of the Yucatan specimens with material kindly furnished by Sydow.

Uromyces sepultus n. sp. urediniis minutis, 0.2 mm. longis, fere hypophyllis; paraphysibus clavatis, subflavis, inflexis, 30-40 μ longis, 10-14 μ latis, membrana æquabiliter tenui; urediniosporis obovoideis vel ellipsoideis, 20-27 x 27-42 μ ; membranis atribrunneis, 1.5-2 μ crassis, moderate et conspicue echinulatis; poris germinationis 2-3, conspicuis, fere æquatorialibus; teliis inconspicuis, cinereo-brunneis, angustis 0.1-0.2 mm., coalescentibus in lineas 0.2-2.0 mm. longis, profunde sepultis in texto hospitis, tarde nudis; teliosporis angulatim obovoideis, 14-20 x 22-26 μ , solide dispositis; membranis atribrunneis, deorsum tenuibus 0.5 μ , gradatim spissatis, ad apicem 1-2 μ , levibus, pedicellis brevibus, usque 15 μ longis. (Plate 2, C, D.)

In foliis *Setariæ tenacis*. Legit J. R. Swallen (2440, specimen typicum) Chichen Itza, Yucatan, July 7-13, 1932; (2506) Tizimin, Yucatan, Mexico, July 14-16, 1932; E.W.D. et Mary M. Holway, Gavea, Río de Janeiro, Brazil, August 10, 1921 (Rel. Holw. 102), Río de Janeiro, Brazil, January 13, 1922 (Rel. Holw. 119). Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia mostly hypophyllous, small, 0.2 mm. long; paraphyses clavate, incurved, 30 to 40 μ long, 10 to 14 μ wide above, wall thin, yellowish; urediniospores obovoid or ellipsoid 20 to 27 by 27 to 42 μ ; wall dark brown, 1.5 to 2 μ , moderately and prominently echinulate, the pores conspicuous 2 to 3 approximately equatorial. Telia inconspicuous mostly hypophyllous, narrow 0.1 to 0.2 mm. wide, linear, coalescing in lines 0.2 to 2.0 mm. long, deep seated in the host tissue, grayish brown, tardily naked bordered by a thin

layer of brown hyphæ; teliospores angularly obovoid, 14 to 20 by 22 to 26 μ , closely compacted; wall dark brown, thin below 0.5 μ gradually thickening up to 1 to 2 μ at apex, smooth; pedicel short, up to 15 μ .

On *Setaria tenax* (Rich.) Beauv. (*Chaetochloa tenax* (Rich.) Hitch.) II, III. Chichen Itza, Yucatan, Mexico, July 7-13, 1932, J. R. Swallen (2440, type); II, III. Tizimin, Yucatan, Mexico, July 14-16, 1932, J. R. Swallen (2506); II, III. Rio de Janeiro, Brazil, Aug. 10, 1921, E.W.D. and Mary M. Holway 1013 (Rel. Holw. 102.); II, Gavea, Rio de Janeiro, Brazil, Jan. 13, 1922, E.W.D. and Mary M. Holway, 1474 (Rel. Holw. 119).

The Brazilian collections were issued in the Reliquiæ Holwayanæ as *Uromyces leptodermis* Syd. *Uromyces sepultus* differs from the latter species in larger urediniospores, with more prominent echinulations, paraphyses in the uredinium, the compact, long-covered telia, arranged in lines and thickened apices of the teliospores. Both the uredinia and telia are rather deep seated. They both rupture the epidermis rather tardily and the ruptured epidermis tends to remain more or less overarching. The urediniospores have very prominent, coarse, spike-like echinulations. Due to the deep-seated arrangement of the telia and the long-covering epidermis the teliospores are compressed into compact masses causing them to take on irregular shapes. The telia when abundant tend to unite in longitudinal lines up to 2 mm. long which, however, are rather inconspicuous on account of their narrowness.

There is a decided resemblance to *Puccinia chaetochloæ* Arth. It differs in somewhat larger urediniospores and one-celled teliospores.

Puccinia chichenensis n. sp. urediniis amphigenis, sparsis, linearibus, 0.5-1.0 mm. longis, fulvis; urediniosporis late ellipsoideis vel obovoideis, 18-23 x 22-28 μ ; membranis 2-4 μ crassis, fulvis, conspicuis echinulatis; poris germinationis 4-6, sparsis; teliis amphigenis, sparsis, 0.3-0.5 μ longis, atribrunneis; teliosporis late ellipsoideis, 20-25 x 28-32 μ ad medium non constrictis, utrinque rotundatis; membranis levibus, castaneo-brunneis, 2-4 μ crassis, gradatim spissatis, crassitudine 4-9 μ ad apicem; pedicellis usque 60 μ longis.

In foliis *Gouinia latifolia*. Legit A. S. Hitchcock, Chulumani, Sur-Yungas, Bolivia, December 22, 1923, (22650 $\frac{1}{2}$); J. R. Swallen, *Gouinia ramosa*, Chichen Itza, Mexico, July 7-13, 1932, (2484, specimen typicum). Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia amphigenous, scattered, linear, 0.5 to 1.0 mm. long, cinnamon-brown, ruptured epidermis evident; urediniospores broadly ellipsoid to obovoid, 18 to 23 by 22 to 28 μ , the wall 2 to 4 μ thick, cinnamon-brown, prominently echinulate, the pores 4 to 6 scattered. Telia amphigenous, scattered, 0.3 to 0.5 mm. long, dark chocolate-brown; teliospores broadly ellipsoid, rounded at both ends not constricted at septum, 20 to 25 by 28 to 32 μ , the wall smooth, chestnut-brown, 2 to 4 μ thick, gradually thickening at apex up to 4 to 9 μ , the pedicel up to 60 μ long.

On *Gouinia latifolia* (Griseb.) Vasey, Chulumani, Sur-Yungas, Bolivia, December 22, 1923, A. S. Hitchcock (22650 $\frac{1}{2}$); *Gouinia ramosa* Swallen, Chichen Itza, Yucatan, Mexico, July 7-13, 1932, J. R. Swallen (2484, type).

This species is close to *Puccinia leptochloæ* Arth. & Fromme, which has been collected on the closely related genus *Leptochloa* (*L. filiformis* (Lam.) Beauv.) in Texas, Mexico and Puerto Rico. It differs from the latter in having thicker walls for the urediniospores which also are prominently

echinulate. The teliospores have longer pedicels than described for *P. leptochloæ*.

Puccinia circumdata n. sp. urediniis amphigenis, lineari-oblongis, 0.3-0.8 mm. longis, pulverulentis, fulvis; paraphysibus copiosis, præcipue ad marginem, clavatis, erectis vel inflexis, 30-50 μ longis, superiore parta 5-10 μ latis, membrana hyalina vel subbrunnea, tenui; urediniosporis ellipsoideis; 20-24 x 24-32 μ ; membranis 1-1.5 μ crassis, pallide flavo-brunneis, moderate et minute echinulatis; poris germinationis 3, æquatorialibus; teliiis amphigenis, parvis, oblongis, 0.2-0.4 μ longis, atribrunneis, tardissime nudis, profunde in texto hospitis sepultis; teliosporis angulatis, 17-26 x 26-36 μ , medio parve constrictis; membranis castaneo brunneis, 1-1.5 μ , supra usque 2-3 μ , levibus, pedicellis brevibus, usque 25 μ longis, hyalinis, aliquando oblique insertis; mesosporis paucis.

In foliis *Panici fasciculati*. Legit J. R. Swallen, Uxmal, Yucatan, Mexico, July 20-21, 1932, (2592, specimen typicum); Chichen Itza, Yucatan, Mexico, July 7-12, 1932 (2389, 2421½); *Paspali yucatanæ*, Lake Chichancanab, Yucatan, (Quintana Roo), Mexico, July 28-29, 1932 (2765). Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia amphigenous, linear-oblong, 0.3 to 0.8 mm. long, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores ellipsoid, 20 to 24 by 24 to 32 μ ; wall 1 to 1.5 μ thick, light yellowish brown, moderately and finely echinulate, the pores 3, equatorial; paraphyses abundant, scattered, more abundantly at the periphery, clavate, straight to incurved, 30 to 50 μ long, 5 to 10 μ wide above, wall thin colorless or light brown. Telia amphigenous, small, oblong, 0.2 to 0.4 mm. long, very tardily naked, deep-seated in host tissue, chocolate-brown; teliospores angular, irregular, 17 to 26 by 26 to 36 μ , wall chestnut-brown, slightly constricted at septum, 1.0 to 1.5 μ up to 2 to 3 μ above, smooth, pedicel short, up to 25 μ , colorless, occasionally obliquely attached; mesospores few.

On *Panicum fasciculatum* Swartz. II, III. Uxmal, Yucatan, Mexico, July 20-21, 1932, J. R. Swallen (2592, type); II, III. Chichen Itza, Yucatan, Mexico, July 7-13, 1932 (2389, 2421½). *Paspalum yucatanum* Chase, II, III, Lake Chichancanab, Yucatan, (Quintana Roo), Mexico, July 28-29, 1932, J. R. Swallen (2765).

This species is evidently very closely related to *Puccinia chætochloæ* Arth. While *P. Chætochloæ* is described without paraphyses in the uredinia, an examination of the type of that species shows that they are present. They are not as abundant as in *P. circumdata* but of a similar type. *P. chætochloæ*, however, has much larger urediniospores 23 to 34 by 30 to 40 μ . The walls of the urediniospores are much thicker 2 to 3 μ and the echinulations much wider and longer.

The telia of *P. circumdata* develop very deeply in the host tissue and are very tardily naked. The teliospores are consequently compressed in their development and are very variable and angular in shape.

Puccinia deformata Berk. & Curt. II, III. On *Olyra latifolia* L. La Libertad, Petén, Guatemala, June 3, 1933, C. L. Lundell (3610). This is not an uncommon rust of tropical America.

Puccinia levis (Sacc. & Bisz.) Magn. On *Paspalum cæspitosum* Flüggé, II, San Miguel, Cozumel Island, Quintana Roo, Mexico, August 6-8, 1932, J. R. Swallen (2863); *Paspalum blodgettii* Chapm., Progreso, Yucatan,

Mexico, August 11-15, 1932, *J. R. Swallen* (2945, 2977); San Miguel, Cozumel Island, Quintana Roo, Mexico, August 6-8, 1932, (2900); *Paspalum hartwegianum* Fourn., Progreso, Yucatan, Mexico, August 11-15, 1932, *J. R. Swallen*, (2965); Tiger Point, Northern River, British Honduras, November 7, 1933, *Percy Gentle* (891A). This is a very common rust of the tropics.

Puccinia sorghi Schw. II. On *Zea mays* L., Uxmal, Yucatan, Mexico, July 20-21, 1932. *J. R. Swallen* (2597). The size and shape of the urediniospore of this collection are not typical for *Puccinia sorghi*. They are obovoid to ellipsoid 22 to 28 by 30 to 44 μ , Arthur and Fromme (N. Amer. Flora, vol. 7, 277-278, 1920) give the urediniospores as broadly ellipsoid or globose, 23 to 29 by 26 to 32 μ .

Puccinia canaliculata (Schw.) Lagerh. II. On *Cyperus canus* Presl. Canasayab, Campeche, Mexico, March 20, 1932. *C. L. Lundell* (1421A). This species is widely distributed in North and South America.

Puccinia heterospora Berk. & Curt. III. On *Abutilon hirtum* (Lam.) Sweet, San Juan, Corozal District, British Honduras, August 17, 1933, *C. L. Lundell* (4966A). In this collection most of the teliospores are one-celled (mesospores), a condition common in the species. This is a common rust in tropical America.

Puccinia lateritia Berk. & Curt. III. On *Borreria laevis* (Lamb.) Griseb. Uaxactun, Petén, Guatemala, April 23, 1931, *H. H. Bartlett* (12705A). A common rust of tropical America.

Puccinia obliqua Berk. & Curt. III. On *Gonolobus* sp. Peto, Yucatan, Mexico, July 26-27, 1932, *W. C. Steere* (2252). This is a fairly common species in tropical America.

Puccinia crassipes Berk. & Curt. I. On *Ipomoea triloba* L., Corozal-Orange Walk Road, British Honduras, September 18, 1933, *C. L. Lundell* (5002A); *Ipomoea* sp., Progreso, Yucatan, Mexico, August 11-15, 1932, *J. R. Swallen* (2961). Only aecia occur on the specimens cited. Pycnia are apparently lacking. Although a number of the infections on the *Lundell 5002* specimen are old as indicated by the discolored and exhausted aecia, yet no telia were found. A similar condition was found to occur for specimens in the Herbarium of the University of Michigan from Cuba, Puerto Rico, Texas and Brazil, except that a few telia were noted on one specimen (*Reliquiae Holwayanae* 395). These are sparingly mixed with the aecia or opposite the aecia on the upper side of the leaf. Also several aecial cups contain teliospores and in one instance at least the aeciospores have been nearly replaced by teliospores. This strongly suggests that the teliospores arise from the same mycelium as the aeciospores. The absence of pycnia and the infrequent occurrence of teliospores suggests that the aecia are repeating aecia, arising from a sporophytic mycelium. Absence of pycnia and associated primary aecia is correlated with the relatively infrequent development of teliospores. This species evidently presents some interesting questions for future investigations.

Puccinia palicoureae n. sp. urediniis hypophyllis, aggregatis, pulverulentis, tarde nudis; urediniosporis 22-24 x 22-32 μ , late ellipsoideis, obovoideis

vel subglobosis; membranis 1.0-1.5 μ crassis, subflavis vel fulvis, exigue et crasse echinulateis; poris germinationis inconspicuis; teliis hypophyllis, inconspicuis, minutis, cereo-brunneis; teliosporis fusoido-oblongis, 12-16 x 32-42 μ , statim germinatibus; membranis hyalinis, æquabiliter tenuissimis, 0.5-1.0 μ ; pedicellis brevibus.

In foliis *Palicourea triphyllæ*. Legit H. H. Bartlett, Mountain Pine Ridge, El Cayo District, British Honduras, May 7, 1931 (13091, specimen typicum) in Herbario Universitatis Michiganensis conservatum.

Uredinia hypophyllous, aggregated in groups, 2 to 10 mm. in diameter on brown spots; uredinia pulverulent, somewhat tardily naked, ruptured epidermis evident; urediniospores 22 to 24 by 22 to 32 μ broadly ellipsoid, obovoid or subgloboid, the wall 1.0 to 1.5 μ thick, pale yellow or cinnamon, somewhat sparsely echinulate, the echinulations prominent, up to 2 μ long and almost as wide at the base, the pores obscure. Telia hypophyllous, intermixed with the uredinia, rather inconspicuous, forming minute, brown waxy crusts; teliospores germinating at once, fusiform-oblong, 12 to 16 by 32 to 42 μ , the wall colorless or slightly tinted, very thin 0.5 to 1.0 μ , uniform; pedicel short.

On *Palicourea triphylla* DC. Mountain Pine Ridge, El Cayo District, British Honduras, May 7, 1931, H. H. Bartlett (13091).

This species is separated from *Puccinia fallaciosa* Arth., by the pronounced coarse echinulations of the urediniospores and the larger teliospores. The urediniospores resemble those of *Uredo psychotricola* P. Henn., differing in the somewhat thinner walls. It has larger urediniospores than *Uredo palicoureae* P. Henn.

In making the above comparisons it was noted that the name *Puccinia fallaciosa* which has been used by Arthur (Mycologia, vol. 9, 84, 1917) for a rust on *Palicourea crocera*, *P. riparia* and *Psychotria patens* from Puerto Rico had previously been applied by Thümen (Oesterr. Bot. Zeitschr., vol. 26, 183, 1876) to a rust on *Tulipa gesnerianæ*. Thümen's name is now included by the Sydows (Monographia Uredinearum, vol. 1, 639, 1904) under *Puccinia tulipæ* Schroet. It, therefore, becomes necessary to apply a new name to the rust described by Arthur on *Palicourea* and *Psychotria*. Dr. Arthur was consulted and has suggested *fallax*, consequently *Puccinia fallax* Arth. nom. nov. (*Uredo fallaciosa* Arth. *Puccinia fallaciosa* Arth. not. *P. fallaciosa* Thüm.) is proposed.

Puccinia urbaniana P. Henn. III. On *Stachytarpheta jamaicensis* (L.) Vahl. San Miguel, Cozumel Island, Quintana Roo, Mexico, August 6-8, 1932. W. C. Steere (2815). The teliospores of this collection show a considerable variation in size, 12 to 30 by 24 to 60 μ . This greatly exceeds the range, 14 to 22 by 28 to 45 μ , given for the species by Arthur and Jackson.

Dasyscypha gregaria (Kunze) P. Henn. (*D. foveolata* Berk. & Curt.) O, II, III. On *Xylopia frutescens* Aubl., La Libertad, Petén, Guatemala, April 7, 1933, C. L. Lundell (2557A); Maskall, British Honduras, March 31, 1934, Percy H. Gentile (1197A). This is a very curious rust with an interesting history. It was first distributed by Weigelt under the name of *Puccinia gregaria* Kz. The specimens were accompanied by a description and the following statement: "Surinam Leg. et exsicc. Weigelt, 1827, determ. Kunze." Berkeley and Curtis (Jour. Acad. Nat. Sci. Phil. 2d. ser., vol. 2: 281-282, 1854) described and illustrated the same rust from Surinam

on an unknown host. They proposed a new genus, *Dasyspora*, for it and the name *Dasyspora foveolata*. Pazsche (Hedwigia, vol. 29, 158-159, 1890.) also described the species under the name of *Puccinia winteri* from a collection made by Ule on *Xylopia* at Río de Janeiro, Brazil in August 1887. Arthur (Resultats sci. Congr. Inter. Bot. Wein, 1905, p. 346) applied the name *Dasyspora* to all the short-cycled species of *Puccinia* on the basis that *Dasyspora foveolata* was a short-cycled *Puccinia*. However, Hennings (Hedwigia, vol. 35, 230-231, 1896) had previously shown that the species is not short-cycled but possesses uredinia of a type which do not allow its inclusion in the genus *Puccinia*. The genus *Dasyspora* is therefore monotypic. Apparently the specific name *gregaria* was validly published with the distribution of the Weigelt collection and accompanying description, antedating the publication of Berkeley and Curtis, and necessitating the combination *Dasyspora gregaria* according to Hennings.

As shown in Plate 3, A and B, the species is unique. The two-celled teliospores resemble those of *Puccinia* except that the markings are much prolonged at the two extremities. The uredinial stage macroscopically simulates a hypomycete. The statement concerning the accompanying "*Oidium parasiticum*" on the label of the Weigelt specimen refers to the uredinia. The urediniospores are borne at the extremities of much-branched multicellular hyphae which project through the stomata. The apical cell is narrowed and curved in a curious manner, the urediniospore being borne on the upper and somewhat flattened side of the crook.

Puccinia abrupta Dietel & Holw. II, III. On *Viguiera dentata* var. *helianthoides* (H.B.K.) Blake, Tuxpeña, Campeche, Mexico, January 12, 1932, C. L. Lundell (1724). This is a fairly common rust of tropical America.

Uredo ignava Arth. II. On *Bambusa vulgaris* Schrad., occupied clearings, La Libertad, Peten, Guatemala, April 9, 1933, C. L. Lundell (2647A). This species is known only on *Bambusa vulgaris* in the Caribbean region, having been reported from Cuba, Puerto Rico, the Dominican Republic, Trinidad, Guiana, and now the Yucatan Peninsula.

Uredo fuirenæ P. Henn. II. On *Fuirena umbellata* Rottb. Maskall Pine Ridge, British Honduras, February 15, 1934, Percy Gentle (1169A).

Uredo anacardii n. sp. urediniis amphigenis et cauliculis, aggregatis, subflavis, pulverulentis; urediniosporis ellipsoideis vel late obovoideis, 14-18 x 18-22 μ ; membranis hyalinis vel subflavis, 2 μ crassis, dense et minute echinulatis; poris germinationis inconspicuis.

In foliis *Anacardii occidentalis*. Legit H. H. Bartlett, Uaxactun, Petén, Guatemala, April 26, 1931 (12752). Specimen typicum in Herbario Universitatis Michiganensis conservatum.

Uredinia amphigenous and caulicolous, aggregated in brownish spots 2 to 8 mm. diameter, yellowish, pulverulent, ruptured epidermis conspicuous; urediniospores ellipsoid to broadly obovoid, 14 to 18 by 18 to 22 μ ; wall colorless or slightly tinted yellow, about 2 μ thick, fairly closely and finely echinulate; pores obscure.

On *Anacardium occidentale* L. Uaxactun, Petén, Guatemala, April 26, 1931, H. H. Bartlett (12752).

Uredo rubescens Arth. II. On *Dorstenia* sp. El Cayo District, British Honduras, March 5-13, 1931, *H. H. Bartlett* (11984a).

Aecidium pulverulentum Arth. O, I. On *Randia* sp. Chichen Itza, Yucatan, Mexico, June 15, 1932, *W. C. Steere* (1319). Arthur has reported this species from Panama and from Jalisco and Morelos, Mexico.

Aecidium tournefortiae P. Henn. O, I. On *Tournefortia hirsutissima* L. Laguna Perdida, Petén, Guatemala, April 30, 1932, *C. L. Lundell* (1669). This species has been reported from Brazil, the West Indies and Panama.

Aecidium yucatanense n. sp. æciis hypophyllis, aggregatis, albis, cylindricis, 0.2 mm. latis, usque 0.5 mm. longis; cellulis peridii rhomboideis, 10-20 x 22-30 μ ; interiore pariete 2-4 μ crasso; exteriore 2-4 μ crasso, verrucoso vel rugoso; æciosporis angulato-ellipsoideis, 20-30 x 24-30 μ ; membranis 1.0-1.5 μ inferne, ad apicem conspicue spissatis, 6-14 μ crassis, dense et minute verruculosis.

In foliis *Hamelia patentis*. Legit *W. C. Steere*, Chichen Itza, Yucatan, Mexico, June 5, 1932 (1002a, specimen typicum). In Herbario Universitatis Michiganensis conservatum.

Pycnia not seen. Æcia hypophyllous, crowded into groups 3 to 5 mm. across, short, cylindric, about 0.2 mm. in diameter, up to 0.5 mm. long, white; peridial cells rhomboidal, 10 to 20 by 22 to 30 μ , inner wall 2 to 4 μ , striate, outer 2 to 4 μ , verrucose to rugose; æciospores angularly ellipsoid, 20 to 23 by 24 to 30 μ , wall 1.0 to 1.5 μ markedly thickened at apex 6 to 14 μ , closely and finely verrucose.

On *Hamelia patens*. Chichen Itza, Yucatan, Mexico, *W. C. Steere* (1002a) June 5, 1932.

USTILAGINALES

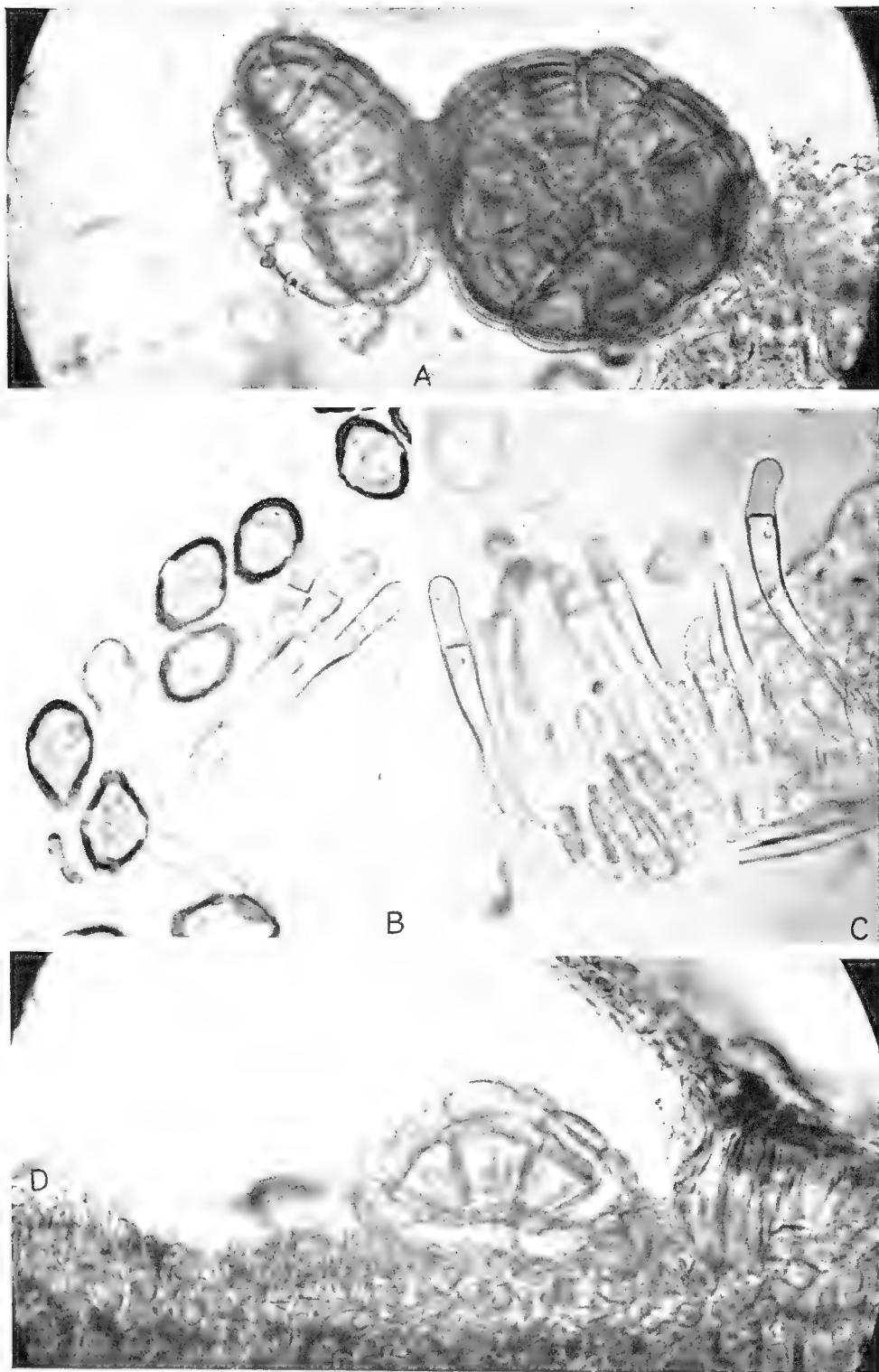
Cintractia limitata Clinton, on *Cyperus ligularis* L., Belize, British Honduras, March 15, 1933, *C. L. Lundell* (1949). Clinton reports this species only from Puerto Rico.

Mykosyrinx cissi (DC.) G. Beck, on *Cissus* sp., Cocquericot, El Cayo District, British Honduras, March 18, *H. H. Bartlett* (12055); Corozal District, British Honduras, 1931-1932, *Percy Gentle* (542 and 587); Little Cocquericot, Belize River, British Honduras, April 25, 1933, *C. L. Lundell* (4299); Chichen Itza, Yucatan, Mexico, June 25, 1932, *W. C. Steere* (1541); Tuxpeña, Campeche, Mexico, February 16, 1932, *C. L. Lundell* (1343); La Libertad, Petén, Guatemala, April 4, 1933, *C. L. Lundell* (2495). This species produces conspicuous witches brooms, often more than a foot across. This smut is consequently more frequently collected than less conspicuous species.

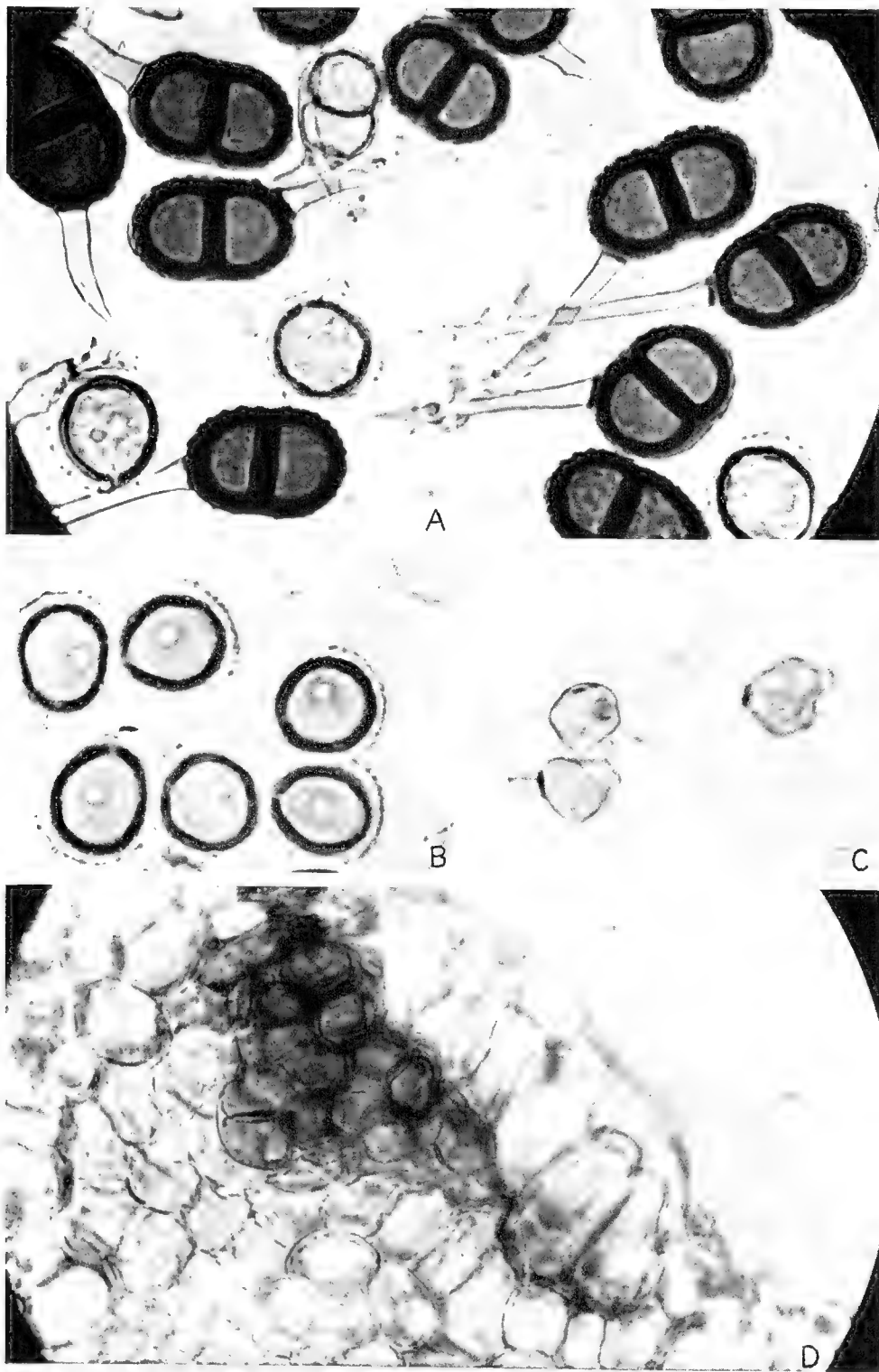
Thecarphora haumani Speg. On *Iresine celosia*, Uaxactun, Petén, Guatemala, April 6, 1931, *H. H. Bartlett* (12479). The sori are mostly in the inflorescences, usually in the ovaries and perianths, but occasionally developing on the rachis, stems and lower surfaces of the leaves. They are more or less globoid, 0.5 to 5.0 mm. in diameter and are aggregated in groups up to 4 cm. long. The spores are inclosed in a persistent, straw-colored membrane which finally breaks irregularly, exposing the pale brown

spore-mass. The spore-balls are solid, subglobose to irregular, occasionally elongated and measure 18 to 42 by 22 to 44 (52) μ . They are light cinnamon in color and composed of 3 to 13 cells. (Plate 4A.) The cells are irregularly polyhedral, 10 to 14 by 12 to 20 μ , the inner walls smooth, thin, 1 μ , and the outer 2.0 to 2.5 μ , verrucose with the markings arranged in more or less irregular lines or reticulations.

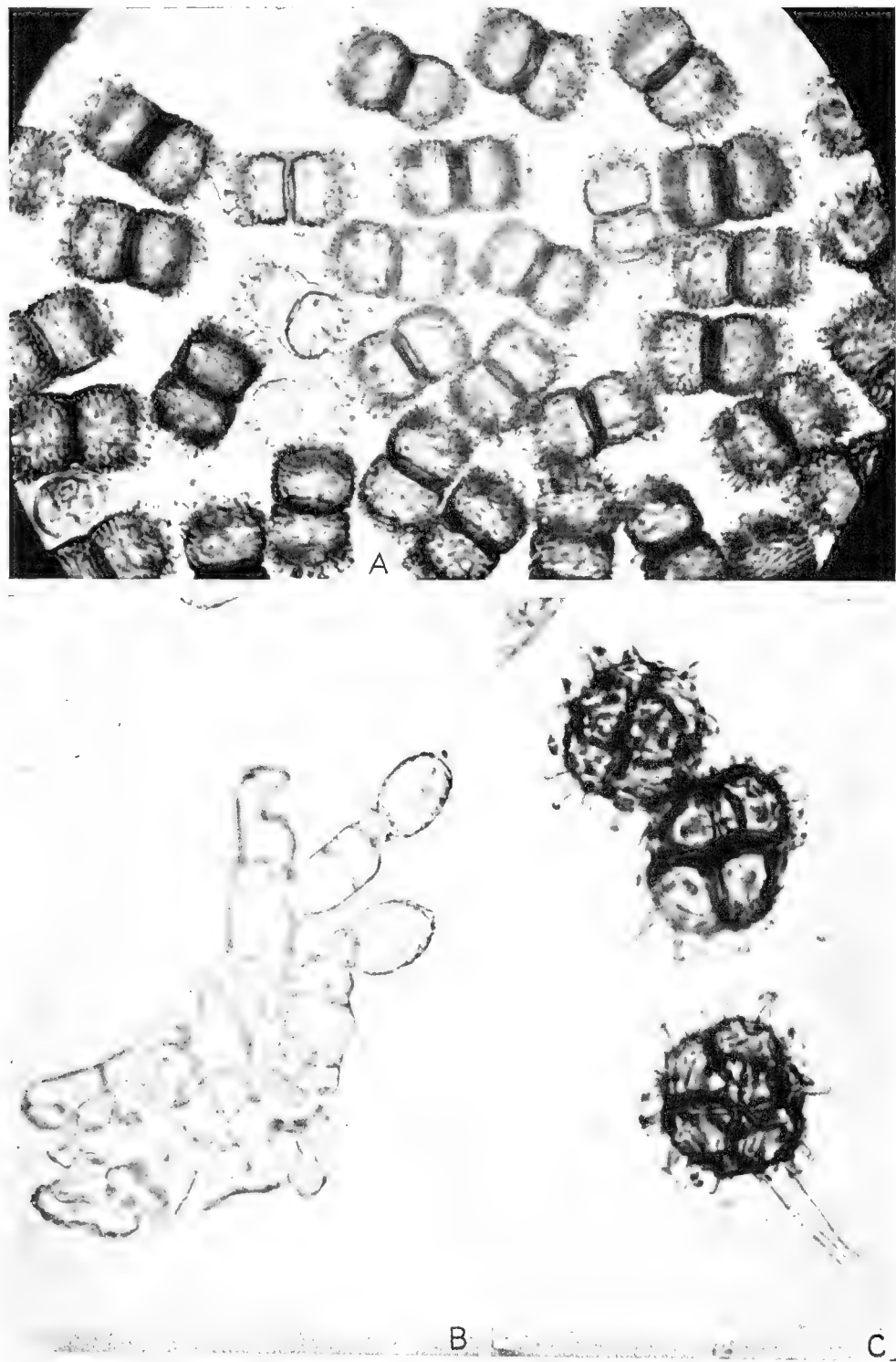
Two smuts have been described on *Iresine*. In 1919, J. A. Elliot (Mycologia, vol. 11, 87-88, 1919) described the species *Tolyposporium iresine* from *Iresine paniculata* collected near Mount Vernon, Indiana, in the United States. Jackson (Mycologia, vol. 12, 154-156, 1920) later transferred the species to the genus *Thecaphora*. *Thecaphora haumani* was described by Spegazzini in 1925 from *Iresine paniculata* in Argentina. Apparently both species have been known only from the type collections. Through the kindness of Professor H. S. Jackson it has been possible to compare the Guatemalan collection with material of *T. iresine*. I am also indebted to him for a copy of Spegazzini's description of *T. haumani*. The spore balls of *T. iresine* are much larger than those of *T. haumani*, containing 15 to 70 cells and measuring 50 to 70 by 60 to 90 μ . (Plate 4B.) The Guatemalan collection agrees very well with Spegazzini's description of *T. haumani* (Revista Argent. Bot., vol. 1, 150, 1925).



Ravanelia bifenestrata n.sp. A, Heads of teliospores. B, Urediniospores and paraphyses; note two thin areas in the wall of the urediniospores. C, Paraphyses; note fusion below and the abrupt thickening of the wall at the apex. D, Head of teliospores showing short stipe. $\times 500$.



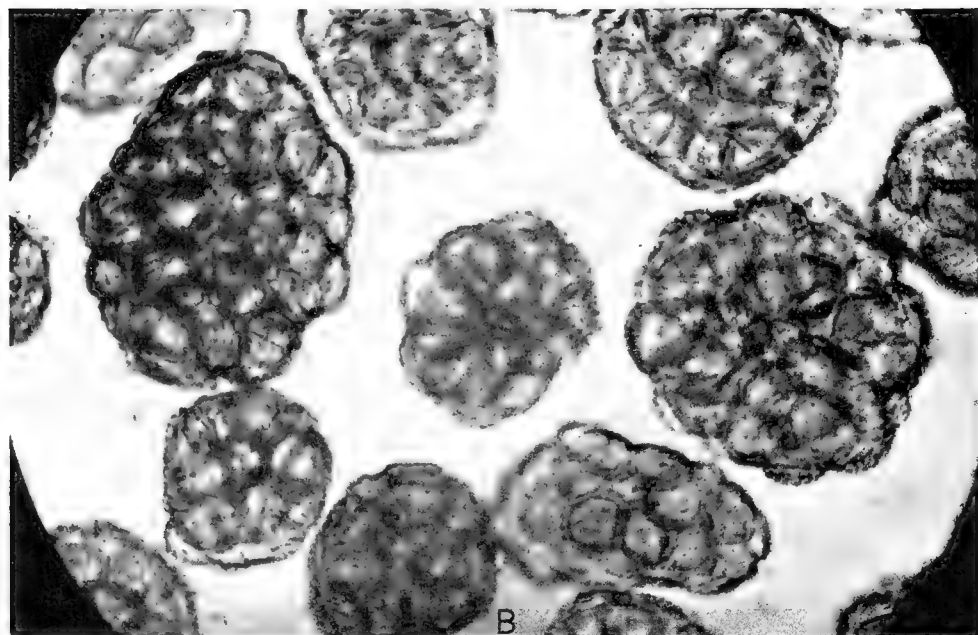
Prospodium cydistae n.sp. A, Teliospores. B, Urediniospores. $\times 500$.
Uromyces sepultus n.sp. C, Teliospores. D, Section through the deep seated, compact telium. $\times 500$.



Dasyspora gregaria. A, Teliospores. B, Portion of the uredinium. $\times 500$.
C, *Sphaerophragmium fimbriatum* n.sp. Teliospores. $\times 500$.



A



B

A, Spore balls of *Thecaphora haumani*, contrast with B, *Thecaphora iresine*. $\times 500$.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

VI

LICHENS FROM THE YUCATAN PENINSULA

By JOYCE HEDRICK

With four plates

[Issued November 26, 1935.]



LICHENS FROM THE YUCATAN PENINSULA ¹

The following list is based upon specimens collected for the most part by botanists of the expeditions of the University of Michigan and Carnegie Institution of Washington sent into the Maya Region during 1931 to 1933. Specimens were collected by H. H. Bartlett in 1931, by Wm. C. Steere and J. R. Swallen in 1932, and by C. L. Lundell in 1932 and 1933. A few specimens collected by Morton E. Peck near Belize, British Honduras in 1906 have been included.

The collecting of lichens was incidental, attention having been devoted mostly to the phanerogams. The larger conspicuous foliose lichens naturally were more frequently collected, while the smaller foliose and crustose forms are poorly represented. This list can therefore be considered only a beginning in the study of the lichen flora of this region.

Two species here reported have not been described previously. Most of the others are species more or less common throughout tropical regions, while a few are cosmopolitan in range.

Specimens of *Synechoblastus* and *Leptogium* were identified by J. L. Lowe. Photographs were made by Professor E. B. Mains.

Pseudopyrenula pupula (Ach.) Müll. Arg. On trees, Belize, British Honduras, *Peck*, 1906.

Melanotheca cruenta (Mont.) Müll. Arg. On trees, Belize, British Honduras, *Peck*, 1906.

Trypethelium kunzei Fée. On trees, Tizimin, Yucatan, *Swallen d2*, July 14-16, 1932.

Trypethelium tropicum (Ach.) Müll. Arg. On trees, Haulover, British Honduras, *Lundell 1827*, March 11, 1933.

Phylloporina epipylla (Fée) Müll. Arg. On leaves, Lake Chichancanab, Quintana Roo, *Steere 2424, 2444*, July 28-29, 1932.

Strigula complanata (Fée) Nyl. On leaves, Chichen Itza, Yucatan, *Steere 1011a*, June 5, 1932.

This and the following species and variety are very common, forming small, round to irregular, whitish gray or rarely greenish patches on the upper side of the leaves. The specimens seen were rarely fruited.

Strigula elegans (Fée) Müll. Arg. On leaves, Chichen Itza, Yucatan, *Steere 1472*, June 21, 1932.

¹Papers from the Department of Botany and the Herbarium of the University of Michigan, No. 544.

Strigula elegans hirtella Müll. Arg. On leaves, Lake Chichancanab, Quintana Roo, *Steere 2357*, July 28-29, 1932.

Graphis afzelii Ach. On trees, Tizimin, Yucatan, *Swallen d1*, July 14-16, 1932; San Miguel, Cozumel Island, Quintana Roo, *Steere 2696*, August 6-8, 1932.

Graphis scripta (L.) Ach. On trees, Peto, Yucatan, *Steere 2213*, July 26-27, 1932.

Chiodecton sanguineum (Swartz) Vainio. On old wood, Mountain Pine Ridge, El Cayo, British Honduras, *Bartlett 11907*, March 3, 1931; Yaxha-Remate Road, Petén, Guatemala, *Lundell 2061*, March 23, 1933.

A very showy lichen, growing in large areas over old wood and logs. The thallus is reddish, deep rose-color or whitish pruinose, with a deeper brighter red under-surface and upturned margin.

Byssoloma tricholomum (Mont.) Zahlbr. On leaves, San Miguel, Cozumel Island, Quintana Roo, *Steere 2749, 2752, 2764*, August 6-8, 1932.

Rather common on leaves. The black apothecia are very small, but are conspicuous because of the heavy, hairy white margin of thallus about them. The thallus is very thin except around the apothecia. (Plate I, fig. a.)

Leptotrema auberianum (Mont.) Fink. On old wood, Chichen Itza, Yucatan, *Steere 1717*, June 9, 1932.

Leptotrema glaucescens (Nyl.) Müll. Arg. On soil, Limestone Hill, Single Hill Creek, Manatee Creek, Belize District, British Honduras, *Bartlett 11333*, February 1, 1931.

Tricharia macrospora sp. nov. Thallus tenuis vel tenuissimus, glaucescens vel albidus, plus minusve continuus, maculas 1 cm. latas formans, lævigatus vel demum leviter inæqualis, pilis nigris ornatus; apothecia minuta, 0.1-0.25 mm. lata, orbicularia, numerosa et sat dispersa, disco leviter concavo aut planiusculo, carneo vel fuscescente et raro albido-pruinoso, margine tenui, integro, concolore vel pallidiore, leviter prominente; sporæ solitariae, hyalinae, oblongæ, apicibus rotundatis, murales, 19-23 transverse septatæ et 3-5 longitudinale septatæ, 66-94 x 15-23 μ .

Thallus thin or very thin, greenish gray to whitish, more or less continuous in areas up to 1 cm. in diameter, smooth to slightly rough; hairs black, numerous, 1-3 mm., or rarely more, in length, attenuated toward the apices, with a black bulb at the base often somewhat immersed in the thallus; apothecia minute, 0.1-0.25 mm. across, round, numerous and more or less scattered, the disk slightly concave to flat, flesh-colored to brownish and rarely whitish pruinose, the exciple thin, entire, colored like the disk or lighter, slightly prominent; hypothecium and hymenium hyaline; paraphyses simple, septate, becoming gelatinized; asci clavate; spores 1, hyaline, oblong with rounded ends, sometimes slightly curved, 19-23-septate transversely and 3-5-septate longitudinally, the cells almost cubical, 66-94 x 15-23 μ .

The algal host is *Protococcus*.

On leaves, Lake Chichancanab, Quintana Roo, collected by *Wm. C. Steere* 2424, 2438, 2443, 2444, 2454, July 28-29, 1932. (Plate I, fig. b.)

This species differs from the two previously recorded species in the larger spores: *T. melanothrix* Fée reported from the Philippine Islands by Vainio has spores 36-40 x 17-18 μ , and *T. amazonum* Vainio reported from Trinidad has spores 65-66 x 16-26 μ . The genus is characterized by the numerous black hairs borne on the thallus. It is limited to the tropics and is found only on leaves.

Calenia dispersa sp. nov. Thallus tenuis vel tenuissimus, cinereo vel albido-glauescens, plus minusve dispersus, maculas 1-1.5 cm. latas formans, verruculoso-rugulosus; apothecia minuta, 0.1-0.25 mm. lata, orbicularia, primum thallo immersa, dein emergentia et thallo adnata, disco depresso-concavo vel plano, nigro et tenuissime albido-pruinoso, margine tenui, subintegro, prominente, thallo concolore; sporae 8, hyalinae, aciculares, curvatae et raro flexuosae, 5-septatae, loculis cylindricis, 31-40 x 3.5-5 μ .

Thallus thin to very thin, ashy to whitish gray, rarely continuous to more or less scattered, forming patches 1-1.5 cm. across, minutely warty and rough; apothecia minute, 0.1-0.25 mm. across, round, immersed, then superficial and adnate, the disk depressed concave to flat, black and sometimes thinly whitish pruinose, the exciple thin, subentire, prominent, colored like the thallus; hypothecium hyaline to yellowish; hymenium hyaline; paraphyses branched and net-like interwoven; asci clavate; spores 8, hyaline, acicular, curved and rarely flexuose, 5-septate, the cells cylindrical, 31-40 x 3.5-5 μ .

The algal host is *Protococcus*.

On leaves, San Miguel, Cozumel Island, Quintana Roo, collected by *Wm. C. Steere* 2748, 2765, August 6-8, 1932; Lake Chichancanab, Quintana Roo, *Steere* 2439, July 28-29, 1932. (Plate 2, fig. a.)

This species is similar to *C. consimilis* Müll. Arg. from Costa Rica and to *C. pulchella* Müll. Arg. from Brazil, but differing from both in the spores which here are 5-septate and reach 40 μ in length.

Microphiale lutea (Dicks.) Zahlbr. On old wood, Tancah, Quintana Roo, *Steere* 2583, August 4-5, 1932.

Cænogonium lepieurii (Mont.) Nyl. On trees and twigs and sometimes among mosses, Uxactun, Petén, Guatemala, *Bartlett* 15153, March 20, 1931; Chichen Itza, Yucatan, *Steere* 1253, June 13, 1932, and 1573, June 19, 1932; San Miguel, Cozumel Island, Quintana Roo, *Steere* 2709, 2726, 2746, August 6-8, 1932.

Quite common, forming small dense mats, greenish to light green in color and often fan-shaped. The apothecia when present are conspicuous because of the bright flesh-color or reddish brown disk.

Cænogonium linkii Ehrh. On twigs, Monte Santa Teresa, Petén, Guatemala, *Lundell* 2721, April 12, 1933.

Synechoblastus nigrescens (Huds.) Trev. On trees, Chichen Itza, Yucatan, *Steere* 1166, June 11, 1932.

Leptogium adpressum Nyl. On trees, Bermuda Bank, Belize River, British Honduras, *Lundell* 1990, March 17, 1933.

The thalloid body becomes much wrinkled and very uneven, the apothecia are commonly large with irregular margin.

Leptogium bullatum (Ach.) Mont. On trees, Chichen Itza, Yucatan, *Steere 1254, 1281*, June 13, 1932.

Leptogium chloromelum (Ach.) Nyl. On trees, Chichen Itza, Yucatan, *Steere 1144b*, June 7, 1932.

Leptogium hildenbrandii (Garov.) Nyl. On dead twigs, Muna, Yucatan, *Steere 2173*, July 22-23, 1932.

Leptogium marginellum (Swartz) S. F. Gray. On trees, Big Fall, Bermuda Bank, Belize River, British Honduras, *Lundell 1958, 1987*, March 17, 1933.

The margin of the thalloid lobes is beset with clumps of minute isidoid branchlets, the exciple of the minute apothecium is also very uneven. (Plate 2, fig. b.)

Leptogium phyllocarpum (Pers.) Mont. On trees, Haulover, British Honduras, *Lundell 1824*, March 11, 1933.

Leptogium tremelloides (L.) S. F. Gray. On trees and old wood, Tizimin, Yucatan, *Swallen 2559*, July 14-16, 1932; Chichen Itza, Yucatan, *Steere 1051, 1144a*, June 6-7, 1932; Champoton, Campeche, *Steere 1872*, July 7-15, 1932; Bermuda Bank, Belize River, British Honduras, *Lundell 1958, 1988, 1989, 1991*, March 17, 1933.

Leptogium tremelloides azureum (Swartz) Nyl. On trees and old wood, Belize, British Honduras, *Peck, 1906*; Uaxactun, Petén, Guatemala, *Bartlett 12717*, April 24, 1931.

Coccocarpia pellita cronia (Tuck.) Müll. Arg. On trees, La Libertad, Petén, Guatemala, *Lundell 3056*, April 27, 1933.

Coccocarpia pellita granulosa Müll. Arg. On trees, Belize, British Honduras, *Peck, 1906*.

Coccocarpia pellita lividorufa (Mey. & Flot.) Zahlbr. On trees, Bermuda Bank, Belize River, British Honduras, *Lundell 1982*, March 17, 1933.

This and the other varieties herein listed are usually conspicuous because of the heavy black hypothallus forming a margin about the thallus. In this variety the hypothallus is especially conspicuous, forming a black margin around the circular thalli. The smaller younger thalli have a heavier margin than the larger more mature specimens. (Plate 3, fig. a.)

Coccocarpia pellita parmelioides (Hook.) Müll. Arg. On old wood, Chichen Itza, Yucatan, *Steere 1409*, June 19, 1932.

Bacidia fuscorubella (Hoffm.) Bausch. On trees, Tancah, Quintana Roo, *Steere 2610*, August 4-5, 1932.

Phyllopsora parvifolia (Pers.) Müll. Arg. On trees, San Miguel, Cozumel Island, Quintana Roo, *Steere 2850*, August 6-8, 1932.

The thallus is composed of minute squamules imbricated into a continuous uneven crust. The apothecia are small, with the disk flat to convex, becoming black. The plant closely resembles species of *Lecidea*, but is separated by the thallus. (Plate 3, fig. b.)

Lecanora cinereocarnea (Eschw.) Vainio. On twigs and shrubs, Muna, Yucatan, *Steere 2156b*, July 22-23, 1932; San Miguel, Cozumel Island, Quintana Roo, *Steere 2978b*, August 6-8, 1932.

Lecanora subfusca (L.) Ach. On wood, Tizimin, Yucatan, *Swallen 2565*, July 14-16, 1932.

Lecanora subfusca allophana Ach. On old wood, Chichen Itza, Yucatan, *Steere 1030*, June 6, 1932.

Parmelia coralloidea (Mey. & Flot.) Vainio. On old wood, Chichen Itza, Yucatan, *Steere 1714, 1716*, June 19, 1932; La Libertad, Petén, Guatemala, *Lundell 2158*, March 29, 1933.

Parmelia cristifera Tayl. On trees and old wood, Bermuda Bank, Belize River, British Honduras, *Lundell 1981*, March 17, 1933; La Libertad, Petén, Guatemala, *Lundell 2158, 2237*, March 29-30, 1933.

Parmelia latissima Fée. On trees and old wood, Uaxactun, Petén, Guatemala, *Bartlett 12502*, April 5, 1931; Haulover, British Honduras, *Lundell 1824*, March 11, 1933; La Libertad, Petén Guatemala, *Lundell 2237*, March 30, 1933 and *Lundell 3227*, May 9, 1933.

This and the preceding species are seemingly very common. Both are conspicuous, the thallus large, greenish gray above and dark below—black toward the center and brown toward the ascending margins. In this species the thallus is smooth or sometimes more or less covered with minute coraloid branchlets, while the preceding species bears numerous soredia on the ascending margins.

Parmelia perforata Ach. On trees, Calakmul, Campeche, *Lundell 1172*, January 1, 1932.

Parmelia saccatibola Tayl. On trees, Peto, Yucatan, *Steere 2356a*, July 26-27, 1932.

The one specimen agrees with descriptions and with a specimen of the species from Costa Rica identified by C. W. Dodge.

Parmelia sulphurata Nees. & Flot. On trees and old wood, Tizimin, Yucatan, *Swallen 2538*, July 14-16, 1932; Chichen Itza, Yucatan, *Steere 1712, 1713*, June 19, 1932; Bermuda Bank, Belize River, British Honduras, *Lundell 1981*, March 17, 1933; La Libertad, Petén, Guatemala, *Lundell 2237*, March 30, 1933.

A common tropical species, often distinguished by the yellowish color within the thallus. Several of our specimens show the dense isidioid condition of the upper-surface of the thallus. (Plate 4, fig. a.)

Ramalina complanata (Swartz) Ach. On trees, shrubs, and twigs, Tuxtepec, Campeche, *Lundell 1111*, December 21, 1931; Champoton, Campeche, *Steere 1810a*, July 7-15, 1932; Muna, Yucatan, *Steere 2156a*, July 22-23, 1932; San Miguel, Cozumel Island, Quintana Roo, *Steere 2978a*, August 6-8, 1932; Progreso, Yucatan, *Steere 3122*, August 11-15, 1932.

Ramalina solediantha Nyl. On trees, Uxmal, Yucatan, *Steere 2045*, July 20-21, 1932.

Usnea florida strigosa Ach. On trees, La Libertad, Petén, Guatemala, *Lundell 2987*, April 24, 1933.

Usnea trichodea Ach. On trees, Calakmul, Campeche, *Lundell 1171*, January 1, 1932.

Bombyliospora domingensis (Pers.) Zahlbr. On trees, Scan Yui Cenote, Chichen Itza, Yucatan, *Steere 1701*, June 29, 1932; Champoton, Campeche, *Steere 1826*, July 7-15, 1932; Lake Chichancanab, Quintana Roo, *Steere 2361*, July 28-29, 1932; San Miguel, Cozumel Island, Quintana Roo, *Steere 2657, 2797*, August 6-8, 1932.

A small but conspicuous crustose lichen, the thallus very thin, greenish gray to ashy in color, the apothecia usually reddish brown with a bright yellowish to deep orange exciple.

Buellia æruginascens (Nyl.) Zahlbr. On old wood, Belize, British Honduras, *Peck, 1906*.

An inconspicuous crustose form, the thin ashy thallus usually limited by a black hypothallus, the apothecia whitish to greenish pruinose with a heavy black exciple. (Plate 4, fig. b.)

Buellia parasema (Ach.) DeNot. On shrubs and old wood, Belize, British Honduras, *Peck, 1906*; Champoton, Campeche, *Steere 1810b*, July 7-15, 1932.

Physcia alba (Fée) Müll. Arg. On trees, Tizimin, Yucatan, *Swallen 2564*, July 14-16, 1932; Chichen Itza, Yucatan, *Steere 1011*, June 5, 1932.

Physcia stellaris (L.) Nyl. On trees, Uxmal, Yucatan, *Steere 2047*, July 20-21, 1932.

Amphiloma languinosa (Ach.) E. Fries. On trees and old wood, Tizimin, Yucatan, *Swallen 2560, 2566*, July 14-16, 1932.

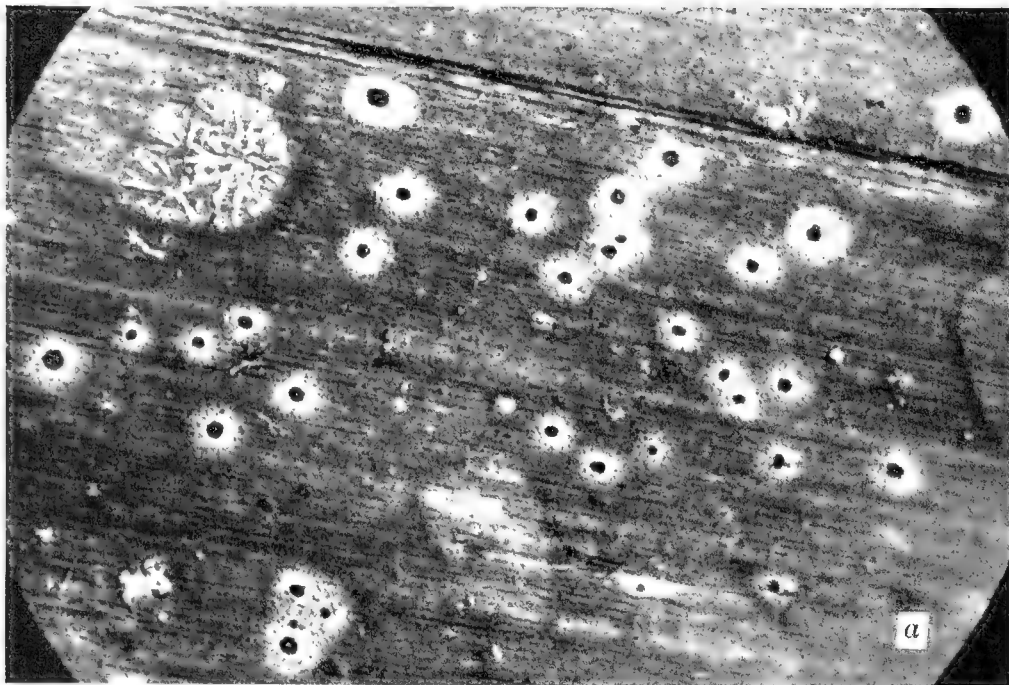


FIG. a *Byssoloma tricholomum* (Mont.) Zahlbr. Portion of a leaf showing several of the very small apothecia with the dense margin of thallus. Enlarged 15x.

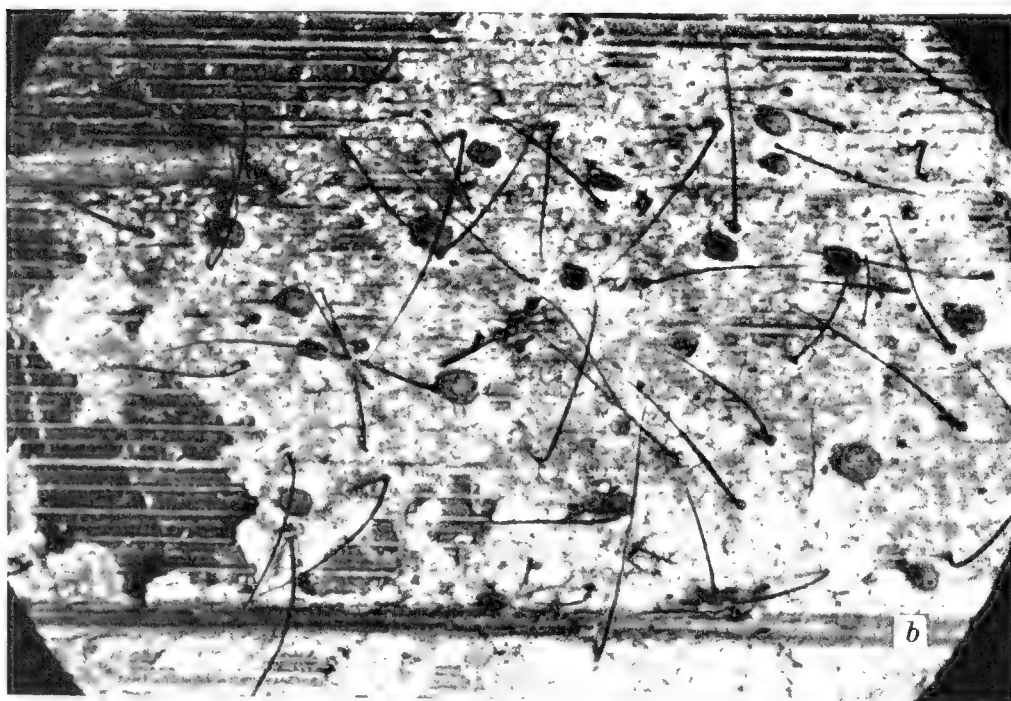


FIG. b—*Tricharia macrospora* Hedrick. Portion of a leaf, showing the very thin thallus with numerous hairs attenuated toward the apices and enlarged into a bulb at the base. The minute, scattered apothecia are plainly seen. Enlarged 15x.

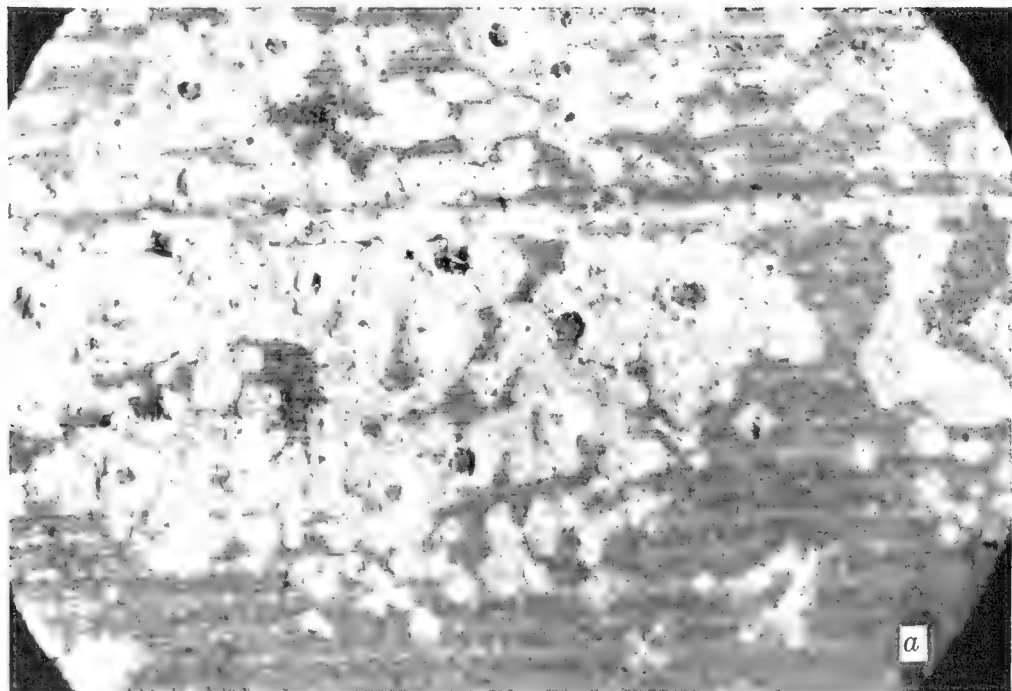


FIG. *a* *Calenia dispersa* Hedrick. A portion of a leaf, showing patches of ashy-colored thallus and many apothecia, some more or less immersed in the thallus and others superficial. Enlarged 15x.

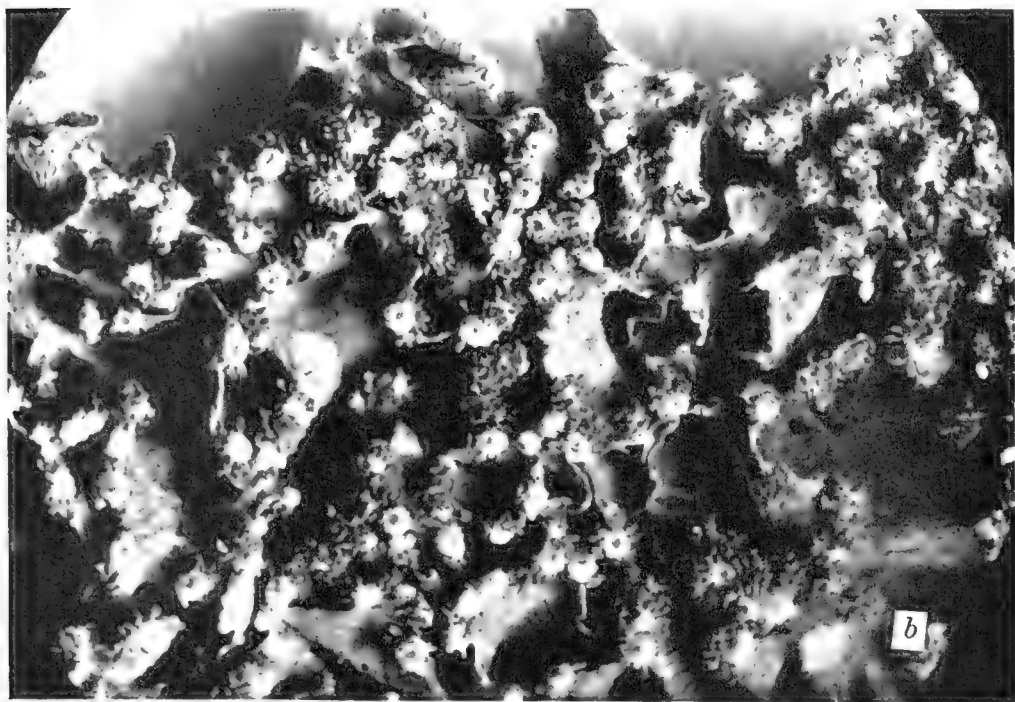
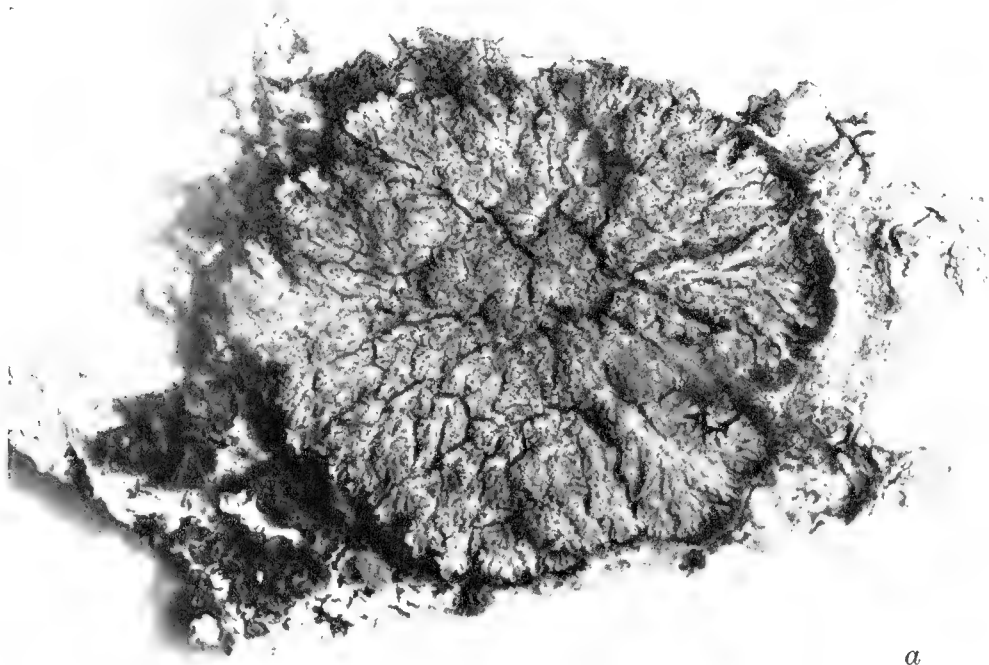
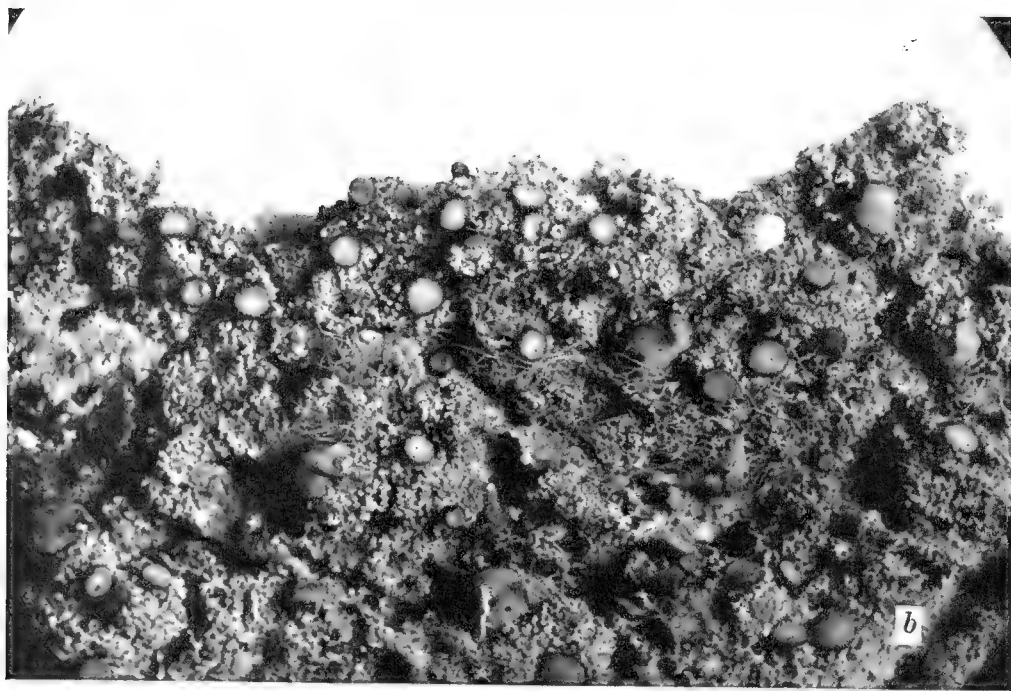


FIG. *b* *Leptogium marginellum* (Swartz) S. F. Gray. Small portion of a thalloid body, showing the uneven surface of the lobes and the minute coralloid branchlets on the margin of the lobes and apothecia. Enlarged 15x.



a

FIG. *a*—*Coccocarpia pellita lividorufa* (Mey. & Flot.) Zahlbr. A small plant showing the circular thallus with its heavy black edge of hypothallus. Enlarged 5x.



b

FIG. *b* *Phyllopsora parvifolia* (Pers.) Müll. Arg. Portion of a plant showing the minute, rough squamules which make up the thallus, and the small lecidea-like apothecia. Enlarged 10x.

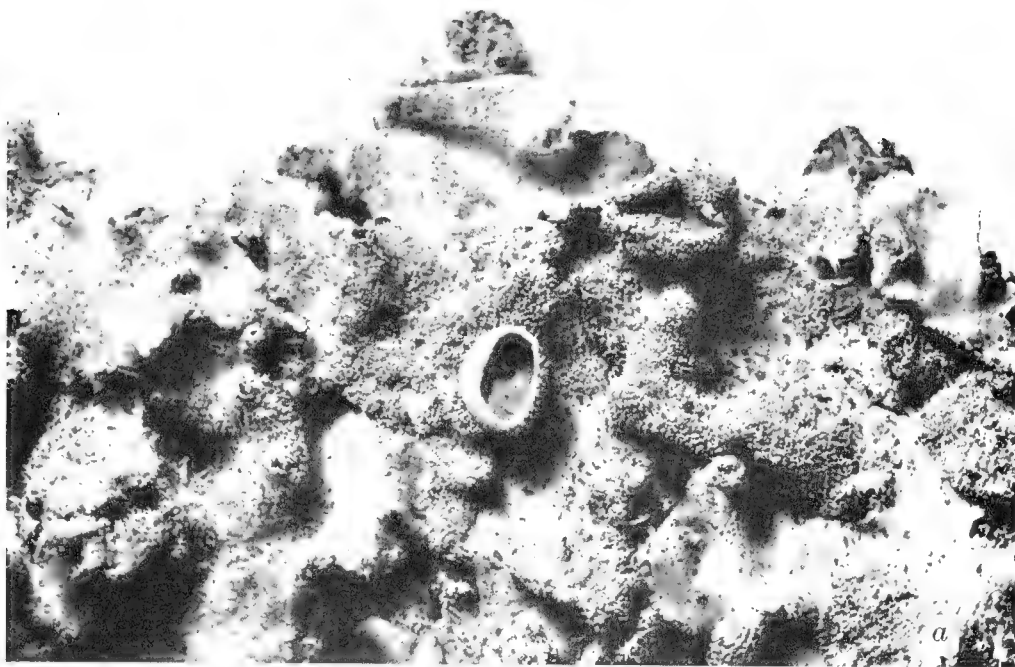


FIG. a *Parmelia sulphurata* Nees. & Flot. A portion of a rather large thallus, showing two apothecia. The very thickly isidioid condition of thallus and apothecia is very conspicuous. Enlarged 5x.

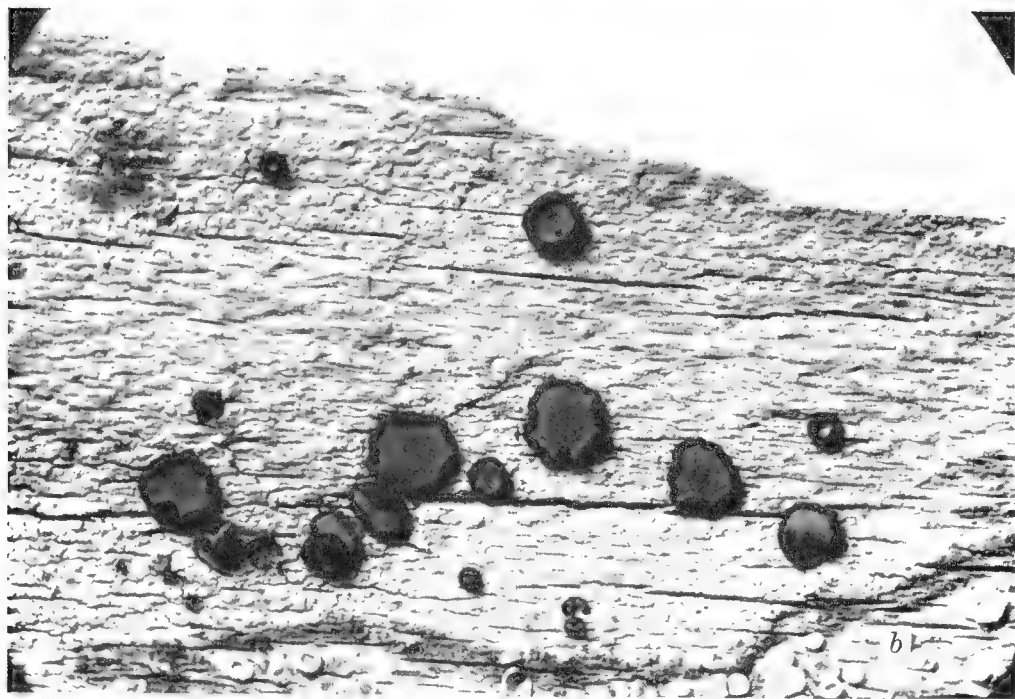


FIG. b—*Buellia aruginascens* (Nyl.) Zahlbr. Showing the dark limiting hypothallus at the lower edge of the thallus and several apothecia with the heavy irregular exciple. Enlarged 10x.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

VII

MARINE ALGÆ FROM THE YUCATAN PENINSULA

By **WM. RANDOLPH TAYLOR**

[Issued November 26, 1935.]

MARINE ALGÆ FROM THE YUCATAN PENINSULA ¹

MARINE ALGÆ FROM BRITISH HONDURAS

Two areas of the Yucatan peninsula were represented in collections available to the writer for study at the University of Michigan. The first in importance is that of Belize and the coast line immediately to the south, where excellent collections were secured by C. L. Lundell and W. C. Schipp. By their efforts, about 80 species can be reported. The second area is that of Progreso, at the northern end of the peninsula, where J. R. Swallen and W. C. Steere obtained some interesting specimens.

At Belize the principal algal habitats seem to have been relatively sheltered ones. There are many cays and low shore-lines bordered with mangroves (*Rhizophora*). On the prop roots of these, the usual and rather characteristic flora was dominated by *Enteromorpha lingulata*, *Bryopsis pennata* and *B. plumosa*, *Caloglossa leprieurii*, *Catenella opuntia*, *Amphibia montagnei* and *A. tenella*. In open areas among the mangroves mud-favoring types, such as *Caulerpa crassifolia mexicana*, *C. fastigiata*, *C. sertularioides* and *Spyridia filamentosa* appeared. The turtle grass, *Thalassia testudinum*, often on a sandy bottom, afforded shelter to several species which grew mixed with it or on its stems and rhizomes: *Batophora cerstedi*, *Caulerpa cupressoides*, *Halimeda monile*, *H. simulans*, *H. tridens*, *Penicillus capitatus*, *Udotea flabellum* and many others. From the generally finely sandy stretches favored by these, the gradation to banks of broken coral and shell is fairly continuous, and in such a transition is found conditions favorable to the growth of *Batophora cerstedi*, *Anadyomene stellata*, *Penicillus dumetosus*, *Dictyota cervicornis*, *D. ciliolata*, *Hypnea cornuta*, *Acanthophora muscoides*, *Digenia simplex* and others. It appears by report that there are well-developed coral reefs off the outlying cays, many of which are large, but most of the collecting was done more close to the mainland, and the reports of material on coral may represent the vegetation of protected and secondary coral areas rather than the great outside reefs exposed to severe wave action. To such a coral habitat, however, are attributable *Cladophora fuliginosa*, *Cladophoropsis membranacea*, *Caulerpa racemosa*, *Sargassum polyceratum*, *Turbinaria turbinata*, *Galaxaura squalida* and *G. subverticillata*, *Gelidium rigidum*, *Ochtodes secundiramea* and some other species. Relatively little of the Schipp and Lundell collections represents material drifted ashore from deeper habitats, but *Halymenia floresia* was secured in this way only; in general it has been the writer's experience that the littoral algæ and those from the immediate

¹Papers from the Herbarium and the Department of Botany of the University of Michigan, No. 542.

sublittoral do not come ashore as abundantly in the American tropics as they do in more northern waters, except after particularly severe storms. Consequently, a selection of algæ drifted onto a beach is much less likely to give a good idea of the flora of the off-lying reefs there than in a similar New England station. To this the Sargassa are a particular exception. Most of the species of this genus come ashore rather abundantly and in good condition. Some of the littoral species were secured in this fashion in these British Honduras collections; with them, we note the characteristically pelagic species found throughout the Carib area, *Sargassum fluitans* and *S. natans*. The complete list of species represented follows.

MYXOPHYCEÆ

Lyngbya confervoides Gom. Buttonwood Cay, May, *Schipp*. Growing on coral in shallow water.

CHLOROPHYCEÆ

Enteromorpha lingulata J.Ag. Buttonwood Cay, Water Cay, May, *Schipp*. Growing on mangrove roots in shallow, often muddy, water.

Ulva fasciata Delile. Water Cay, February, *Schipp*. Among driftweed along the beach.

Chætomorpha brachygona Harv. Stann Creek, April, *Schipp*. In a tidal lagoon along the beach.

Cladophora fascicularis (Mart.) Kütz. Punta Gorda, November, *Schipp*. Occasional in shallow water, generally growing on driftwood.

Cladophora fuliginosa Kütz. Silk Cay, May, *Schipp*. Growing on coral in shallow water.

Cladophoropsis membranacea (C.Ag.) Børg. Stann Creek, April, *Schipp*. Drifting over reefs in light-green spongy masses.

Anadyomene stellata (Wulf.) C.Ag. Punta Gorda, November, *Schipp*. Belize, March, *Lundell*. Growing in shallow water, on a rocky or coral-strewn bottom.

Valonia ægagrophila C.Ag. Water Cay, February, *Schipp*. Forming elongated masses on a coral bed in shallow water.

Acetabulum crenulatum (Lamx.) Kütz. All Pines, September, *Schipp*. Belize, March, *Lundell*. On piling along a pier and in shallow water around the cays, common.

Batophora œrstedii J.Ag. Belize, March, *Lundell*. Abundant on *Thalassia* rhizomes, coral fragments, etc., in shallow water around the cays.

Batophora œrstedii var. *occidentalis* (Harv.) Howe. Belize, March, *Lundell*. In shallow water around the cays.

Bryopsis pennata Lamx. Buttonwood Cay, May, *Schipp.* In shallow muddy water on shaded mangrove roots.

Bryopsis plumosa (Huds.) C.Ag. Buttonwood Cay, May, *Schipp.* Growing on mangrove roots in shallow water.

Caulerpa crassifolia (C.Ag.) J.Ag., var. *mexicana* (Sond.) J.Ag. Water Cay, May, *Schipp.* Growing in silt among mangroves.

Caulerpa cupressoides (West) C.Ag. Punta Negri, Silk Cay, May, *Schipp.* Growing in shallow water in coral silt, often among sea-grasses. The collections were not uniform; those from Punta Negri in part approached the var. *turneri* Weber-v. Bosse, and in part accorded with the var. *mamillosa* (Mont.) Weber-v. Bosse, f. *nuda* Weber-v. Bosse, while that from Silk Cay seemed nearest to poorly developed f. *typica* Weber-v. Bosse.

Caulerpa fastigiata Mont. Buttonwood Cay, May, *Schipp.* Growing in shallow water among the mangroves.

Caulerpa racemosa (Forsk.) J.Ag., f. Silk Cay, May, *Schipp.* Growing on corals in very shallow water and exposed at low tide.

Caulerpa racemosa var. *clavifera* (Turn.) Weber-v. Bosse. Silk Cay, May, *Schipp.* Growing on rocks in shallow water.

Caulerpa sertularioides (Gmel.) Howe. All Pines, September; Water Cay, May, *Schipp.* Growing in shallow water, rooted in silt which often was well compacted, and often among mangroves. The specimens from Water Cay accorded well with the f. *brevipes* (J.Ag.) Sved., but the blades reached a length of 10.5 cm., considerably in excess of that ordinarily ascribed to the form.

Caulerpa taxifolia (Vahl.) C.Ag. All Pines, September, *Schipp.*

Avrainvillea longicaulis (Kütz.) Murr. & Bood. All Pines, September, *Schipp.* Rare; growing among broken coral.

Halimeda monile Lamx. All Pines, September; Silk Cay, May, *Schipp.* Belize, *Lundell.* Rare; among sea-grasses on a sandy bottom in shallow water.

Halimeda opuntia (L.) Lamx. Silk Cay, May; Water Cay, February, *Schipp.* Belize, *Lundell.* Growing on silt and among coral reefs in shallow water. Most of this material corresponded to var. *typica* Bart., but one piece from Silk Cay approached closely the var. *triloba* (Decne.) Bart.

Halimeda simulans Howe. Punta Negri, May; All Pines, September, *Schipp.* Growing in shallow sandy places among sea-grasses.

Halimeda tridens (Ell. & Sol.) Lamx. Punta Negri, May; All Pines, September; Silk Cay, May, *Schipp.* Infrequent; growing in shallow water along the beaches and among sea-grasses. Part of the Silk Cay material

corresponded to the f. *tripartita* (Bart.) Collins, but otherwise the specimens appeared to be f. *typica* (Bart.) Collins.

Penicillus capitatus Lamk. Punta Negri, May; All Pines, September; Silk Cay, May, *Schipp.* Belize, *Lundell.* Growing in shallow water in sand among sea-grasses.

Penicillus dumetosus (Lamx.) Blainy. All Pines, September; Silk Cay, May, *Schipp.* Growing among broken coral fragments and coral silt in shallow water, rare.

Rhypocephalus phoenix (Ell. & Sol.) Kütz. Silk Cay, May, *Schipp.* Very rare; growing in coral silt in shallow water.

Udotea flabellum (Ell. & Sol.) Howe. All Pines, March; Silk Cay, May, *Schipp.* Growing in shallow water in coral sand and silt, often among sea-grasses.

PHÆOPHYCEÆ

Hydroclathrus clathratus (Bory) Howe. Silk Cay, May, *Schipp.* Forming sponge-like masses on coral reefs in shallow water.

Dictyota cervicornis Kütz. Stann Creek, April; Silk Cay, May, *Schipp.* Growing on coral fragments and coral reef rock in shallow water, and drifting onto the beach.

Dictyota ciliolata Kütz. Silk Cay, May, *Schipp.* Growing on a bottom of broken corals in shallow water.

Dictyota divaricata Lamx. Punta Gorda, November, *Schipp.* Occasional; growing on a rocky bottom in shallow water.

Dilophus guineensis (Kütz.) J.Ag. Silk Cay, May, *Schipp.* Common; among coral in shallow water.

Padina sanctæ-crucis Børg. Silk Cay, May, *Schipp.* Young plants attached to *Dictyota ciliolata*, but fertile.

Sargassum fluitans Børg. Belize, March, *Lundell.* Floating offshore.

Sargassum natans (L.) J. Meyen. Belize, March, *Lundell.* The commoner floating *Sargassum*.

Sargassum polyceratium Mont. Silk Cay, May, *Schipp.* Growing on coral in shallow water.

Sargassum vulgare C.Ag. Stann Creek, April, *Schipp.* Drifting off the coral reefs.

Turbinaria turbinata (L.) Kuntze. Silk Cay, May, *Schipp.* Belize, March, *Lundell.* Growing on the coral reefs in shallow water, and drifted ashore.

RHODOPHYCEÆ

Erythrocladia subintegra Rosenv. New Town, October, *Schipp.* On *Polysiphonia*.

Liagora valida Harv. Silk Cay, May, *Schipp.* Growing on corals in shallow water.

Galaxaura squalida Kjellm. All Pines, September; Silk Cay, May, *Schipp.* Growing in shallow water on coralline rocks exposed at low tide.

Galaxaura subverticillata Kjellm. Silk Cay, May, *Schipp.* Growing on coral in shallow water.

Gelidium rigidum (Vahl) Grev. Silk Cay, May, *Schipp.* Growing on coral in shallow water.

Catenella opuntia (Good & Wood.) Grev., var. *pinnata* (Harv.) J.Ag. Belize, March, *Lundell*. In shallow water around the cays.

Gracilaria convervoides (L.) Grev. All Pines, September, *Schipp.* Growing in shallow water on rocks.

Gracilaria cornea J.Ag. All Pines, September, *Schipp.* Growing in the coral beds.

Gracilaria lacinulata (Vahl) Howe. Water Cay, February, *Schipp.* Attached to corals in shallow water.

Gracilaria mamillaris (Mont.) Howe. Punta Gorda, November, *Schipp.* A rare species in this locality, growing on a rocky bottom in shallow water.

Hypnea cervicornis J.Ag. Punta Gorda, November, *Schipp.* Belize, March, *Lundell*. Conspicuous in shallow water on a rocky bottom.

Hypnea cornuta (Lamx.) J.Ag. Stann Creek, March; Silk Cay, May, *Schipp.* Growing on a bottom of broken corals, as among the reefs in shallow water, and drifting ashore.

Hypnea musciformis (Wulf.) Lamx. New Town, September; Silk Cay, May, *Schipp.* Growing in shallow water among sea-grasses and broken corals.

Cœlothrix irregularis (Harv.) Børg. Silk Cay, May, *Schipp.* Growing on corals in shallow water.

Caloglossa lepriurii (Mont.) J.Ag. Belize, March, *Lundell*. On mangrove roots in shallow water around the cays.

Acanthophora muscoides (L.) Bory. Stann Creek, April, *Schipp.* In shallow water off rocky beaches.

Amphibia montagnei (Harv.) Kuntze. Belize, March, *Lundell*. On mangrove roots in shallow water.

Amphibia tenella (Vahl) Kuntze. Belize, March, *Lundell*. On mangrove roots in shallow water.

Bryothamnion seaforthii (Turn.) Kütz. Belize, March, *Lundell*. In shallow water around the cays.

Digenia simplex (Wulf.) C.Ag. All Pines, September, *Schipp*. Belize, March, *Lundell*. Growing in shallow water around the keys, usually on shells or broken corals.

Herposiphonia secunda (C.Ag.) Ambr. Belize, March, *Lundell*. Attached to *Turbinaria*, with *Jania*, etc.

Heterosiphonia gibbesii (Harv.) Falk. Stann Creek, April, *Schipp*. Drifted onto coral reefs. Ordinarily a plant growing attached to broken reef rock in rather shallow water.

Heterosiphonia wurdemanni (Bail.) Falk. Belize, March, *Lundell*. Attached to *Turbinaria*, with *Jania*, etc.

Laurencia gemmifera Harv. Belize, March, *Lundell*. In shallow water around the cays.

Laurencia obtusa (Huds.) Lamx. Punta Gorda, November; Silk Cay, May, *Schipp*. Belize, *Lundell*. Growing in shallow water on a rocky bottom.

Laurencia papillosa (Forsk.) Grev. All Pines, September; Silk Cay, May, *Schipp*. Belize, *Lundell*. Common on broken coral in shallow water, and to a depth of ten feet at high tide.

Laurencia poitei (Lamx.) Howe. Belize, March, *Lundell*. In shallow water around the cays.

Murrayella pericladus (C.Ag.) Schmitz. Silk Cay, May, *Schipp*. Growing on rocks in shallow water.

Polysiphonia havanensis Mont., f. *mucosa* J.Ag.? Belize, March, *Lundell*. In shallow water around the cays.

Centroceras clavulatum (C.Ag.) Mont. Punta Gorda, November; Silk Cay, May, *Schipp*. Growing on rocks of a beach in very shallow water.

Ceramium nitens (C.Ag.) J.Ag. Silk Cay, May, *Schipp*. Growing in shallow water on coral.

Spyridia filamentosa (Wulf.) Harv. Silk Cay, May, *Schipp*. Belize, March, *Lundell*. In shallow water, often among sea-grasses, variable in habit.

Grateloupia filicina (Wulf.) C.Ag. All Pines, September, *Schipp*. Growing on a rocky bottom in shallow water.

Halymenia floresia (Clem.) C.Ag. Stann Creek, March, *Schipp.* Drifting onto the coral reefs, probably from deeper water.

Ochtodes secundiramea (Mont.) Howe. Silk Cay, May, *Schipp.* Growing on rocks and on coral reefs in shallow water.

Amphiroa fragilissima (L.) Lamx. All Pines, September; Silk Cay, May, *Schipp.* Growing on coral rocks in shallow water; common.

Amphiroa rigida Lamx., var. *antillana* Børg. All Pines (?), September, *Schipp.* Common; growing among the corals.

Amphiroa tribulus (E. & S.) Lamx. Silk Cay (?), May, *Schipp.* Growing on coral in shallow water.

Corallina cubensis (Mont.) Kütz., *emend.* Børg. All Pines, September, *Schipp.* Growing on the coral beds among mangrove roots.

Jania capillacea Harv. Punta Negri, May, *Schipp.* Belize, March, *Lundell.* Growing upon *Halimeda* and *Turbinaria*.

Jania pumila Lamx. Belize, March, *Lundell.* Growing on *Turbinaria*.

Jania rubens (L.) Lamx. Silk Cay, May, *Schipp.* Growing in shallow water on a rocky bottom.

Melobesia farinosa Lamx. Silk Cay, May, *Schipp.* Growing on *Turbinaria*.

MARINE ALGÆ FROM PROGRESO, YUCATAN

There are a few records of marine algæ from Yucatan scattered through the botanical journals; in the aggregate they constitute but a small fraction of the probable flora. The collection under consideration is a very small one, valuable in the light of the poverty of previous records. It was brought by W. C. Steere and J. R. Swallen from the vicinity of Progreso after a visit to that place about the middle of August 1932. Progreso lies on a low, swampy coast in about 20° 16' N.L. The shore-line is uniformly sandy, and the water relatively shallow for several miles from the coast, so that vessels unload to lighters from the open off-shore anchorage. There are no rocky outcrops for many miles along the shore. The algæ were collected in beach pools, in the surf, and floating offshore, except in the three cases noted. The opacity of the inshore water hampered the collection of attached plants. It is reported that after winter storms, very great masses of plants are washed ashore, but these masses probably contain a considerable proportion of sea-grasses.

CHLOROPHYCEÆ

Enteromorpha lingulata J.Ag.

Cladophora fascicularis (Mert.) Kütz.

PHÆOPHYCEÆ

Dictyota cervicornis Kütz.

Dictyota divaricata Lamx. With the preceding on scattered rocks at 12 to 16 feet depth.

Padina vickersia Hoyt.

RHODOPHYCEÆ

Hypnea musciformis (Wulf.) Lamx.

Dasya rigidula (Kütz.) Ardiss. On scattered rocks at 12 to 16 feet depth.

Herposiphonia tenella (C.Ag.) Ambr. On larger algæ from the rocks.

Centroceras clavulatum Mont.

Halymenia floresia (Clem.) C.Ag.

In addition to the foregoing, the writer finds in the Herbarium of the University of Michigan, a specimen from Yucatan collected by Gaumer, correctly determined as *Bryothamnion seaforthii* (Turn.) Kütz. While studying certain West Indian collections at the British Museum of Natural History in 1929 by the kindness of the Keeper of Botany, Mr. J. R. Ramsbottom, and the assistant keeper in charge of the algæ, Mr. Geoffrey Tandy, certain specimens from Yucatan collected by Schott (except as noted) in May 1865 came to light. There may well have been others in the collection. It seems to be worth while to list here those seen, as some changes of identification are to be suggested:

Bryopsis plumosa (Huds.) C.Ag. (as *B. plumosa* Lam.). Sisal, *Schott* 373.

Caulerpa ashmeadii Harv. Sisal, *Schott*.

Caulerpa crassifolia (C.Ag.) J.Ag., var. *mexicana* (Sond.) J.Ag., (as *C. mexicana*). Sisal, *Schott* 368.

Caulerpa prolifera (Forsk.) Lamx. Progreso, April, *Schott* 334.

Halimeda tuna (Ell. & Sol.) Lamx. (as *H. optuntia*). Sisal, *Schott* 786.

Dictyota ciliolata Kütz. (as *D. dichotoma*). Sisal, *Schott* 365.

Zoöbotrys, an animal genus (as *Ascothamnion*). Celestum, *Schott* 377.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

VIII

**ENUMERATION OF THE MALPIGHIACEÆ
OF THE YUCATAN PENINSULA**

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ENUMERATION OF THE MALPIGHIACEÆ OF THE YUCATAN PENINSULA ¹

Despite the fact that the family Malpighiaceæ has recently been monographed by Dr. Fr. Niedenzu in *Das Pflanzenreich*, I have thought it worth while to record here a few additional observations on the species occurring in the Yucatan Peninsula. Niedenzu had seen very few specimens from this region at the time of publication of his monograph. The recent collections of Professor H. H. Bartlett and Mr. C. L. Lundell, made under the auspices of the Carnegie Institution of Washington and the University of Michigan, have disclosed two new species and have added to our knowledge of several of the older species. I am indebted to the curators of the herbaria in the Field Museum of Natural History and the University of Michigan for the loan of their collections of this family.

I have not given common names for the various species, as these are, so far as known, recorded by Standley in his *Flora of Yucatan*. It will be noted, however, that the scientific names here used differ in several instances from those employed by Standley. Niedenzu has divided many of the common species into numerous varieties and forms, many of which do not seem to be of special constancy or taxonomic importance. For the most part these are not mentioned in the present paper. I am also indebted to Dr. J. K. Small's treatment of the Malpighiaceæ in the *North American Flora* for numerous helpful suggestions. A treatment of the North American species correlating Small's treatment with that of Niedenzu is much to be desired, inasmuch as in the latter many of the species recognized by Small are reduced doubtfully to synonymy or are placed among the "Species incertæ." In a few cases I have appended notes on species found outside the limits of the area under consideration. Citations and synonymy are omitted, as these are readily accessible in Niedenzu's monograph.

The keys here presented are drawn, in so far as possible, from herbarium specimens. The identification of specimens by means of Niedenzu's keys is not an easy matter for anyone unfamiliar with the family, owing to his excessive use of minute characters, which are difficult of observation.

KEY TO GENERA

Torus elevated, usually pyramidal and 3-sided; fruits winged.

Samaras with well-developed lateral wings, the dorsal wing much smaller and reduced.

Fertile stamens 3, staminodia 2..... 1. GAUDICHAUDIA

Fertile stamens 10, staminodia none.

Lateral wings of samara not lobed.

Stipules borne on the stems; flower stalks articulate and
bibracteolate above base..... 2. MASCAGNIA

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- Stipules borne on the petioles; flower stalks not articulate,
bibracteolate at base..... 3. *HIRÆA*
- Lateral wings of samara deeply 2-lobed..... 4. *TETRAPTERIS*
- Samaras with lateral wings obsolete, the dorsal wing more prominent.
- Fertile stamens 10.
- Dorsal wing of samara much reduced, thickened on the ventral (adaxial) edge..... 5. *BRACHYPTERYS*
- Dorsal wing well developed (or in one species reduced), thickened on the dorsal (abaxial) edge..... 6. *BANISTERIA*
- Fertile stamens usually 4; samara wings well developed, thickened ventrally 7. *STIGMAPHYLLON*
- Torus flat or slightly concave; fruit a drupe.
- Styles obtuse or thickened at apex.
- Styles distinct..... 8. *MALPIGHIA*
- Styles united..... 9. *BUNCHOSIA*
- Styles subulate at apex..... 10. *BYRSONIMA*

Inasmuch as the identification of flowering material is often difficult for those unacquainted with the various genera, the following artificial key, based solely on the species occurring in Yucatan, has been prepared.

- Styles subulate at apex. Erect shrubs or trees with terminal racemes of large yellow flowers (often reddish-tinged in age); leaves tomentose beneath..... 10. *BYRSONIMA*
- Styles obtuse or variously dilated at apex.
- Flowers purple or lilac. Styles free.
- Erect shrubs or small trees..... 8. *MALPIGHIA*
- High-climbing vines.
- Leaves not over 3 cm. long, glabrous; peduncles and pedicels glabrate..... *Mascagnia vacciniifolia*
- Leaves usually larger, tomentose beneath; peduncles and pedicels rusty-tomentose..... *Banisteria beecheyana*
- Flowers yellow.
- Fertile stamens fewer than 10.
- Fertile stamens 3, staminodia 2, leaves small, tomentose; style 1..... 1. *GAUDICHAUDIA*
- Fertile stamens 4, staminodia 6; leaves larger, glabrous or sericeous; styles 3..... 7. *STIGMAPHYLLON*
- Fertile stamens 10.
- Flower stalks articulate and bibracteolate at base, the flowers in umbels. Styles free.
- Stipules borne on the petiole; vines..... 3. *HIRÆA*
- Stipules borne on the stem; erect shrubs..... 5. *BRACHYPTERYS*
- Flower stalks articulate and bibracteolate above base, the flowers in umbels, racemes, or panicles. Stipules borne on the stem.
- Flowers of the compound inflorescence umbellate.
- Styles free.
- Petals sericeous externally..... 2. *MASCAGNIA*
- Petals glabrous..... 4. *TETRAPTERIS*
- Flowers racemose.
- Erect shrubs or trees; styles connate to apex; bracts and bracteoles of the inflorescence small..... 9. *BUNCHOSIA*
- Vines; styles free; bracts and bracteoles large.
- Leaves hairy beneath, membranous *Tetrapteris seleriana* and *T. arcana*
- Leaves glabrous beneath, chartaceous..... 6. *BANISTERIA*

1. GAUDICHAUDIA H.B.K.

Only one species occurs in the region under consideration, viz, *G. albida* C. & S. var. *typica* Ndzu. In the Flora of Yucatan, Standley reports this species as *G. mucronata* (M. & S.) A. Juss., a plant with markedly different fruits.

SPECIMENS EXAMINED:

YUCATAN: Progreso, *Gaumer* 1138. Buena Vista Xbac, *Gaumer* 2456. According to Niedenzu, also *Gaumer* 539, distributed as *Metastelma schlechtendalii*.

NOTES ON OTHER SPECIES

GAUDICHAUDIA MOLLIS var. PRINGLEANA Ndzu.

I have examined a specimen of the type collection (*Pringle* 2459, from Guadalajara, Jalisco, Mexico) and find that it is not distinguishable from *G. pentandra* A. Juss. Niedenzu's specimen evidently lacked mature fruits, such as appear on the specimen in the National Herbarium, which show that the plant belongs to the subgenus *Engaudichaudia* rather than *Tritomopterys*.

GAUDICHAUDIA SUBVERTICILLATA Rose

Referred by Niedenzu to the subgenus *Tritomopterys*, but the mature fruits of the type specimen in the National Herbarium show that this species must be placed in *Eugaudichaudia*.

GAUDICHAUDIA PALMERI S. Wats.

Referred to the synonymy of *G. schiedeana* A. Juss. (= *G. albida* C. & S.) by Small (N. Amer. Flora 25: 130. 1910) and Standley (Contr. U. S. Nat. Herb. 23: 571. 1923). Listed among the "species incertæ" by Niedenzu (Das Pflanzenreich IV. 141: 246. 1928).

I have examined two specimens of the type collection and believe that this should be considered a form of *G. mollis* Benth., as treated by Niedenzu (excl. var. *pringleana*). Some confusion concerning the date of publication is apparent in the literature. Niedenzu gives the year as 1882, both Small and Standley as 1885, but the manuscript was not communicated until April 14, 1886.

2. MASCAGNIA Bert.

Petals lilac, glabrous; ovary glabrous; leaves oval, rounded at apex, not over 3 cm. long..... 1. *M. vacciniifolia*

Petals yellow, sericeous externally; ovary hairy; leaves lanceolate or ovate, acute, 5 cm. long or more.

Flowers small, about 10 mm. in diameter; samaras not over 3.5 cm. wide..... 2. *M. polycarpa*

Flowers large, about 20 mm. in diameter; samaras very large, 6 cm. wide or more..... 3. *M. malpighiodes*

1. *Mascagnia vacciniifolia* Ndzu.

A rare species not previously known from British Honduras, where it has been collected at Machaca (*Schipp* S-657).

2. *Mascagnia polycarpa* T. S. Brandeg.

This apparently rare species was transferred to the genus *Hiræa* by Standley, but it is a true *Mascagnia*, most closely related to *M. chlorocarpa* of South America. The flowers are now known for the first time, the original material being in fruit only. The following is the only collection from the Yucatan Peninsula: El Paso, Dept. Petén, Guatemala, *Lundell* 1520.

3. *Mascagnia malpighiodes* (Turcz.) Morton, comb. nov.

Stigmaphyllon malpighiodes Turcz. Bull. Soc. Nat. Moscow 36¹: 582. 1863.

Mascagnia mexicana Ndzu. Gen. *Mascagnia* 29. 1908.

Stigmaphyllon malpighiodes Turcz. was founded on *Botteri* 1073, which is identified by Niedenzu as *M. mexicana*.

SPECIMENS EXAMINED:

GUATEMALA, DEPT. PETÉN: Yaxha-Remate Road, *Lundell* 2078.

BRIT. HONDURAS: El Cayo, *Bartlett* 12924; *Chanek* 133, 203.

The following key will aid in distinguishing the present species from the other North American representatives of the subgenus *Plagiogynixa*. The characters given in the keys by Niedenzu, Small, and Standley do not hold true, and there has been a good deal of confusion in identification. The four species as here delimited are easily recognizable and have natural and mutually exclusive ranges. *M. macroptera* includes *Hiræa mexicana* Rose.

Petals sericeous externally, both in bud and flower.

Samaras with numerous complicate irregular wings

between the dorsal and lateral wings (Guatemala, Salvador, and Nicaragua).....*M. nicaraguensis* (Griseb.) Ndzu.

Samaras without intermediate wings.

Pubescence of the leaves closely appressed; mature

leaves large, 9 cm. long or more; samaras very large, from wing to wing 6 cm. wide or more (Veracruz, Yucatan Peninsula).....*M. malpighiodes* (Turcz.) Morton

Pubescence spreading; mature leaves smaller, 7

(rarely 8) cm. long or less; samaras smaller, up to 5 cm. wide (Nuevo Leon, Tamaulipas, Hidalgo, San Luis Potosí).....*M. septentrionalis* (A. Juss.) Ndzu.

Petals glabrous (Baja California, Sonora, Sinaloa,

Colima).....*M. macroptera* (DC.) Ndzu.

I am indebted to Mr. C. A. Weatherby for calling my attention to the fact that the recently described species *Mascagnia dumetorum* Morton (Proc. Biol. Soc. Wash. 45: 53. 1932), bears a preoccupied name. It may therefore be known as *Mascagnia concinna* Morton, nom. nov. The earlier *Mascagnia dumetorum* Griseb. (Abh. Ges. Wiss. Gött. 24: 67. 1879) is a species of *Banisteria*, viz. *Banisteria dumetorum* (Griseb.) Morton, comb. nov.

3. *HIRÆA* Jacq.

Umbels solitary, many-flowered; leaves tomentose beneath..... 1. *H. quapara*

Umbels clustered, 2-4-flowered; leaves glabrous or appressed-pubescent beneath.

Anthers oblong..... 2. *H. fagifolia*

Anthers globose..... 3. *H. obovata*

1. *Hiræa quapara* (Aubl.) Morton, comb. nov.

Banisteria quapara Aubl. Pl. Guian. 1: 464. 1775.

Hiræa multiradiata A. Juss. Ann. Sci. Nat. II. Bot. 13: 257. 1840.

Hiræa smilacina Standl. Contr. Arn. Arb. 5: 87. 1933.

Nieden zu rejects Aublet's name on the ground that the fruits described and figured belong to a different genus (*Serjania*); but this procedure is hardly justifiable under the International Rules, since the chief part of Aublet's description and figure is concerned with the *Hiræa*, the fruits merely being described incidentally. *Hiræa smilacina*, described from Panama, does not seem to differ in any important respect.

2. *Hiræa fagifolia* (DC.) A. Juss.

A wide-spread species divided by Nieden zu into several varieties and forms which do not seem deserving of taxonomic recognition.

SPECIMENS EXAMINED:

BRIT. HONDURAS: Without definite locality, *Record* 12. Rio Grande, alt. 75 meters, *Schipp* 1105.

3. *Hiræa obovata* (H.B.K.) Ndz. u.

Hiræa borealis Ndz. u. Gen. *Hiræa* 5. 1905.

Hiræa purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 409. 1924.

In 1928, at the time of publishing his monograph of the Malpighiaceæ, Nieden zu had seen but two collections of his species, *Hiræa borealis*. The more abundant material recently collected shows that the distinctions adduced between that and *H. obovata* are not constant and are not accompanied by any peculiarities of foliage, habit, or geographical distribution. In *H. borealis* four of the petals are said to be subentire and those of *H. obovata* denticulate or short-fimbriate. All stages between these extremes are observable in the material at hand. Also the styles of *H. borealis* are said to be merely short-acuminate and those of *H. obovata* uncinat e, but this character also has proved to be variable.

SPECIMENS EXAMINED:

YUCATAN: Izamal, *Gaumer* in 1888. Buena Vista Xbac, *Gaumer* 1040. Chichankanab, *Gaumer* 2410. Without locality, *Gaumer* 24250.

GUATEMALA, DEPT. PETÉN: Uxactun, *Bartlett* 12696, 12709, 12782. La Libertad, *Lundell* 3363, 3370.

BRIT. HONDURAS: Fern Hill, Toledo, *Schipp* S-447. Maskall, *Gentle* 1199, 1241. Little Fall, *Lundell* 4084.

4. TETRAPTERIS¹ Cav.

Stipules of the opposing leaves connate in pairs, leaving a circular scar around the stem; lower lateral wings of the samaras much smaller than the upper. Flowers borne in umbels.

¹The name is used by Nieden zu with the spelling altered, on philological grounds, to *Tetrapteryx*.

- Samaras with irregular intermediate wings and crests between the dorsal and lateral wings, the upper lateral wings not more than 2.5 cm. long, glabrate.....1. *T. discolor*
- Samaras without intermediate wings between the dorsal and lateral wings, the upper lateral wings large, 4-4.5 cm. long, more or less persistently sericeous2. *T. acapulcensis* var. *macrocarpa*
- Stipules all free, small and soon deciduous; lower lateral wings almost equal to the upper.
- Inflorescence racemose, not at all umbellate, the bracteoles borne at the base of the pedicels, conspicuous, 2-7 mm. long, narrowed at base; anthers puberulous; samara wings glabrate even when young.
- Pubescence of the leaves closely appressed.....3. *T. seleriana*
- Pubescence of the leaves spreading.....4. *T. arcana*
- Inflorescence umbellate-paniculate (at least the terminal flowers arranged in 2-4-flowered umbels), the bracteoles minute, 1.5 mm. long or less, broad at base; anthers glabrous; samara wings densely white-sericeous even at maturity. Pubescence of the leaves appressed, when present5. *T. schiedeana*

1. *Tetrapteris discolor* (G. F. W. Meyer) DC.

A widely distributed species not previously reported from British Honduras. I have seen the following specimen: Middlesex, Brit. Honduras, alt. 60 meters, *Schipp* 464.

2. *Tetrapteris acapulcensis* H.B.K. Nov. Gen. & Sp. 5: 168. 1821.

Nieden zu reduces *T. acapulcensis* to a variety of *T. crispa* A. Juss. (Ann. Sci. Nat. II. Bot. 13: 265. 1840), a procedure obviously contrary to all the rules of nomenclature. Our specimen (*Schipp* 1147, from Rio Grande, Missouri, Brit. Honduras) belongs to *Tetrapterys crispa* subsp. *typica* Ndzu. var. *subcordata* Ndzu. f. *macrocarpa* Ndzu. (Pflanzenreich IV. 141: 214. 1928). Niedenzu's form, described from Panama, may be known as *Tetrapteris acapulcensis* var. *macrocarpa* (Ndzu.) Morton, comb. nov.

3. *Tetrapteris seleriana* Ndzu.

Referred doubtfully to the synonymy of *T. schiedeana* by Standley (Flora of Yucatan, p. 317), but it is in reality a distinct species, being distinguished by the characters stated in the key, among others.

SPECIMENS EXAMINED:

YUCATAN: Photograph of type in the Berlin Herbarium, *Seler* 3982. Chichankanab, *Gaumer* 23667, 23738. Izamal, *Gaumer* s. n.
GUATEMALA, DEPT. PETÉN: Tikal, *Bartlett* 12632.
BRIT. HONDURAS: Corozal District. *Gentle* 624; *Lundell* 4997.

4. *Tetrapteris arcana* Morton, sp. nov.

Subg. *Mischolepis*, Sect. *Macrophyllaris*, Subsect. *Stauropteris*. Arbor usque ad 6 m. alta vel liana usque ad 9 m. scandens; caules teretes, dense

sericei; folia opposita, stipulata, stipulis distinctis, minutis, subulatis, nigris, nitidis, petiolata, petiolo dense sericeo-piloso, ca. 5 mm. longo, eglandulifero, lamina elliptica vel ovali, usque ad 7.5 cm. longa et 3.5 cm. lata, subcoriacea, apice breviter acuminata vel fere apiculata, basi rotundata, supra pilosula demum glabrata, subtus perspicue pilosula, margine integra remote glandulifera; inflorescentia racemosa haud umbellata, racemis axillaribus singulis vel geminis, ca. 6 cm. longis, usque ad 14-floris, pedunculo usque ad 17 mm. longo, dense appresso-piloso, apice bracteato, bracteis ovato-lanceolatis vel ovatis, acuminatis, usque ad 5 mm. longis, basi angustatis sed non petiolulatis, dense pilosulis, margine glanduliferis, pedunculo florifero quam pedicello brevior, pilosulo, usque ad 6 mm. longo, apice bibracteolato, bracteolis fere oblongis, usque ad 7 mm. longis, apice obtusis, basi gradatim angustatis, supra glabratis, subtus pilosulis, basi glanduliferis, pedicellis pilosulis, usque ad 8 mm. longis, apice vix dilatatis; sepala ca. 3.5 mm. longa, apice inflexa, sericea, biglandulifera, glandulis lineari-oblongis, ca. 2 mm. longis, discretis; flores lutei, ca. 12 mm. diametro, petalis patulis, unguiculatis, ungue crasso, glabro, lamina oblonga, ca. 4 mm. longa, inconspicue denticulata, plus minusve concava, basi truncata, extus pilos paucos albos malleiformes gerente; filamenta ca. 2.2 mm. longa, basi connata, lata, sursum subulata, ciliata, antheris lineari-oblongis, ca. 1 mm. longis, pilosulis; carpella tres, libera, dense hirsuta; styli crassiusculi, declinati, glabri; stigma obtusum; samaræ nux pilosula, subgloboso-obconica, ca. 3 mm. alta, areola ventrali parva, ca. 1 mm. diametro, alis lateralibus lineari-oblongis vel oblanceolatis, fere æqualibus, 9-11 mm. longis et 2-3.5 mm. latis, glabriusculis, integris, ala dorsali perspicua, deltoidea, ca. 2.5 mm. longa, alis vel rugis intermediis parvis.

Type in the U. S. National Herbarium, No. 1,493,921, collected at Rio Privacion, Mountain Pine Ridge, El Cayo District, British Honduras, February 26, 1931, by H. H. Bartlett (No. 11796). Described by the collector as a straggling tree 20 feet high with yellow flowers.

ADDITIONAL SPECIMENS EXAMINED:

BRIT. HONDURAS: Stann Creek Railway, *Schipp* 25. Machaca, *Schipp* S-600. Stann Creek Valley, *Kinloch* 209.

EL SALVADOR: San Francisco, *Calderon* 2487. Vicinity of Apastepeque, Dept. San Vicente, *Standley* 21337. Vicinity of San Vicente, *Standley* 21239. Vicinity of La Unión, Dept. of La Unión, *Standley* 20674, 20678.

These specimens have been mostly identified as *Tetrapteris schiedeana*, a quite different species, belonging in fact to a different subgenus. *T. arcana* is closely related to *T. seleriana*, but the different type of pubescence satisfactorily distinguishes it. The El Salvador specimens have a somewhat different aspect, but I can not differentiate them at present.

5. *Tetrapteris schiedeana* Cham. & Schl.

Heteropteris yucatanensis Millsp. Field Mus. Pub. Bot. 1: 369. 1898.

A common and wide-spread species in continental North America. The forma *grandifolia* Ndzu. based on *Tonduz* 11456, from Tuis, Prov. Cartago, Costa Rica, is not at all to be associated with this species, but is a form of *T. discolor* (G. F. W. Meyer) DC.

SPECIMENS EXAMINED:

YUCATAN: *Gaumer* 316 (type of *Heteropteris yucatanensis*), 24273, 24319, 24410, 24415. Cozumel Island, *Millsbaugh* 1484, 1484 bis. Chichen Itza, *Steere* 1371, 1476.

BRIT. HONDURAS: Lower Belize River, *Record* s. n. Sibun River, *Bartlett* 11357, 11365. Cornhouse Creek, Belize District, *Bartlett* 11273. Mullins River Road, *Schipp* 21.

NOTES ON OTHER SPECIES

TETRAPTERIS NELSONI Rose, Contr. U. S. Nat. Herb. 5: 143. 1897.

Tetrapterys nummularia Ndz. Gen. Tetrapterys 38. 1909.

Tetrapteris emarginata Bartl. Proc. Amer. Acad. 43: 53. 1907.

Dr. Small in the North American Flora keeps both *Tetrapteris nelsoni* and *T. emarginata* as valid species, but a study of the types of both species does not reveal any essential differences. Niedenzu in Das Pflanzenreich considers both as doubtful synonyms of his species *T. nummularia*. A photograph of the type of this latter species shows its identity with the earlier *T. nelsoni* Rose.

Although not as yet found within the area covered by this paper, *Tetrapteris nelsoni* may be expected, inasmuch as it occurs nearby at Gualán, Guatemala.

5. BRACHYPTERYS A. Juss.

Brachypterys ovata (Cav.) Small

The genus *Brachypterys* is reduced to merely a section of *Stigmaphyllon* by Niedenzu, but the 10 fully fertile stamens contradict his generic description of that genus.

SPECIMENS EXAMINED:

BRIT. HONDURAS: Belize, *Cook & Martin* 28; *Lundell* 4087, 4089; *Kellerman* 5737.

6. BANISTERIA L.

Sepals erect or slightly inclined; ventral areole much less than the nut in diameter, the endocarp back of the areole prominently intruded into the cell; bracts and bracteoles inconspicuous, broad at base; leaves persistently tomentose beneath; petals rose; inflorescence umbellate-paniculate, the apical flowers of each branchlet being borne in 2 to 6-flowered umbels.....

1. *B. beecheyana*

Sepals revolute at apex; ventral areole about equal to the nut in diameter, the endocarp not intruded; bracts and bracteoles larger, narrowed at base; leaves glabrous; petals yellow; inflorescence racemose-paniculate.

Samara with dorsal wing 2.5-4 cm. long..... 2. *B. laurifolia*

Samara with dorsal wing vestigial (not over 5 mm. long)..... 3. *B. heterocarpa*

1. **Banisteria beecheyana** (A. Juss.) C. B. Robinson.

Heteropteris retusa Donn Smith.

A common species, divided by Niedenzu into several varieties and forms which do not seem of special significance. *Heteropteris retusa* Donn. Smith was considered by Niedenzu a doubtful synonym. A study of the type, in the National Herbarium, shows it to be a quite typical specimen of *B. beecheyana*.

SPECIMENS EXAMINED:

YUCATAN: Suitun, *Gaumer* 23447. Calotmul, *Gaumer* 2024. Chichan-kanab, *Gaumer* 2023. Izamal, *Gaumer* s. n. Without locality, *Gaumer* 892, 24263, 24269. Mérida, *Schott* 158. Muna, *Steere* 2139. Chichen Itza, *Steere* 1551. Sotuta, *Flores* 3.

CAMPECHE: Tuxpeña; *Lundell* 978, 1219.

BRIT. HONDURAS: Mountain Pine Ridge, El Cayo District, *Bartlett* 11839. Hillbank Camp, *Pelly* 27. Sibun River, *Gentle* 1430. Stann Creek Railway, *Schipp* 448.

2. *Banisteria laurifolia* L.

A common plant of wide geographic range.

SPECIMENS EXAMINED:

BRIT. HONDURAS: Little Cocquericot, *Lundell* 4109, 4110. Stann Creek Railway, *Schipp* 194. Mullins River Road, *Schipp* 143. Tipparary, *Stevenson* 5. Hector Creek, *Gentle* 1504.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 3025, 3257, 3430, 3544, 4880. Monte Polol, *Lundell* 3035.

3. *Banisteria heterocarpa* Standl.

A most interesting recent discovery. Standley compares this species with *B. laurifolia*, but it is more likely a member of the section *Pachypterys* of Niedenzu, finding its nearest relative in *Banisteria helicina* (Griseb.) Morton, comb. nov. (*Heteropteris helicina* Griseb. ex Mart. Fl. Bras. 12¹: 67. 1858), a species known only from Brazil. It is possible that *B. heterocarpa* is the same as the dubious *Heteropteris lindeniana* A. Juss., known to me only from description.

SPECIMENS EXAMINED:

CAMPECHE: Champotón, *Steere* 1778.

BRIT. HONDURAS: Without locality, *Winzerling* V 15 (type collection). Northern River, *Gentle* 1309. Corozal District, *Gentle* 504. New Town, *Schipp* 818. Honey Camp, *Meyer* 120.

7. STIGMAPHYLLON¹ A. Juss.

Leaves glabrous or glabrate beneath at maturity.

Leaves elliptic, acute, or obtuse at base, pinnately nerved..... 1. *S. ellipticum*

Leaves ovate, cordate at base (with closed sinus), pedately nerved at base, ciliate..... 2. *S. ciliatum*

Leaves sericeous beneath at maturity.

Samaras broad at base, tapering to the apex; leaves entire, pinnately nerved..... 3. *S. puberum*

Samaras constricted near base, enlarged toward the apex; leaves entire or often variously lobed, pedately nerved..... 4. *S. lindenianum*

¹Corrected on philological grounds to *Stigmatophyllum* by Niedenzu and others.

1. *Stigmaphyllon ellipticum* (H.B.K.) A. Juss.

A wide-spread and common species.

SPECIMENS EXAMINED:

YUCATAN: Izamal, Gaumer s. n.

CAMPECHE: Tuxpeña, *Lundell* 975.

BRIT. HONDURAS: Punta Gorda, *Schipp* S-456.

GUATEMALA, DEPT. PETÉN: San Andres, *Lundell* 3128.

2. *Stigmaphyllon ciliatum* (Lam.) A. Juss.

A South American species not recorded from continental North America by Niedenzu. It has been found now in British Honduras (Stann Creek, *Schipp* 880, S-59) and Guatemala (Puerto Barrios, *Deam* 6018; Livingston, *Tuerckheim* II 1356).

3. *Stigmaphyllon puberum* (Rich.) A. Juss.

SPECIMENS EXAMINED:

BRIT. HONDURAS: Punta Gorda, *Schipp* 1009. Corozal-Consejo Road, *Lundell* 4889.

According to Schipp this plant is known as "Eldorado."

4. *Stigmaphyllon lindenianum* A. Juss.

Stigmatophyllum tiliifolium var. *sericans* Ndzu.

Stigmatophyllum tiliifolium var. *sericans* f. *grandifolia* Ndzu.

After a study of a large series of specimens of *S. lindenianum* and *S. tiliifolium* I have concluded that the two species can not be differentiated as treated by Niedenzu in Das Pflanzenreich, where they are keyed as follows:

Leaves subentire, glabrate above, puberulous beneath.....	<i>S. tiliifolium</i>
Some of the larger leaves 3 or 5-lobed, the adult ones pilose beneath	<i>S. lindenianum</i>

The characters of pubescence may be at once discarded as untrue, inasmuch as Niedenzu's own descriptions (and the plants themselves) contradict them. Niedenzu divides *S. tiliifolium* into var. *typicum* (leaves tomentose beneath) and var. *sericans* (leaves sericeous beneath), among other varieties. *Stigmaphyllon lindenianum* is similarly divided into var. *typicum* (leaves sericeous beneath) and var. *lupulus* (leaves tomentose beneath). So it is seen that the only distinction left is to be found in the lobing of the leaves; but this is variable, and an almost complete gradation between entire and deeply lobed leaves is to be found, often on specimens from the same plant. When the character of pubescence alone is considered, the two species may be quickly and accurately recognized even at arm's length. They may therefore be treated as follows:¹

Leaves sericeous beneath, the hairs closely appressed.....	<i>S. lindenianum</i>
(incl. <i>S. tiliifolium</i> var. <i>sericans</i> Ndzu.)	
Leaves tomentose beneath.....	<i>S. humboldtianum</i>
(incl. <i>S. lindenianum</i> var. <i>lupulus</i> (Wats.) Ndzu.)	

¹ *Stigmaphyllon tiliifolium* (H.B.K.) Ndzu. is an invalid name. The proper name is *S. humboldtianum* (DC.) A. Juss.

These varieties have been recognized as distinct species (as *Stigmaphyllon sericans* Small and *S. lupulus* Wats.), but the characters which have been advanced to uphold them seem not to exist in the abundant material at hand.

SPECIMENS EXAMINED:

YUCATAN: Without locality, *Gaumer* 408. Izamal, *Gaumer* s. n. Maxcanu, *Gaumer* 23264. Xnocac, *Gaumer* 23477. Kancabconot, *Gaumer* 23538, 23538 bis, 23900. Pocoboch, *Gaumer* 24075. Jitas, *Schott* 771. Without locality, *Gaumer* 24118; *Johnson* s. n.; *Goldman* 577.

BRIT. HONDURAS: Rio Grande, *Schipp* S-464. Middlesex, *Schipp* 468. El Cayo, *Bartlett* 12939. *Chanek* 164, 186. Little Cocquericot, *Lundell* 4086. Sibun River, *Gentle* 1425.

8. MALPIGHIA L.

- Styles straight, equal. Leaves ovate or lanceolate, usually acute at apex, glabrous..... 1. *M. glabra*
- Styles curved, the two posterior longer and thicker than the anterior. Stamens opposite the two lateral petals not longer or thicker than those opposite the sepals; leaves obovate or oblong, rounded or emarginate at apex, glabrate; common peduncle of the inflorescence usually obsolete..... 2. *M. punicifolia*
- *Stamens opposite the lateral petals obviously longer and thicker than those opposite the sepals; leaves canescent or sericeous; common peduncle well developed.
- Leaves rounded or retuse at apex, even at maturity densely silvery-sericeous beneath, oval, 2-3.5 cm. broad; peduncle 12-23 mm. long; styles uncinat..... 3. *M. lundellii*
- Leaves acuminate, canescent beneath, oblong or lanceolate, 1-2 cm. broad; peduncle 4-6 mm. long; styles obtuse..... 4. *M. incana*

1. *Malpighia glabra* L.

A very common species, often cultivated.

SPECIMENS EXAMINED:

YUCATAN: Lake Chichankanab, *Gaumer* 23653, 23721. San Anselmo, *Gaumer* 1755. Progreso, *Flores* s. n. Without locality, *Gaumer* 972.

CAMPECHE: Tuxpeña, *Lundell* 886, 1378. Reforma, *Lundell* 837.

BRIT. HONDURAS: Corozal District, *Gentle* 151, 164, 225, 463, 466, 531, 536. San Andrés, *Gentle* 144, 830. Punta Gorda, *Schipp* 1030. El Cayo, *Bartlett* 11981, 12001, 12881; *Chanek* 116, 196. Orange Walk District, *Winzerling* s. n.

GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1585.

2. *Malpighia punicifolia* L.

This species is quite as common as *M. glabra*.

SPECIMENS EXAMINED:

YUCATAN: Chichen Itza, *Steere* 1439; *Bequaert* 31. Izamal, *Gaumer* 706. Kancabconot, *Gaumer* 23878, 23878 bis. Silam, *Gaumer* 23331. Suitun, *Gaumer* 23309. Without locality, *Gaumer* 23982.

CAMPECHE: Tuxpeña, *Lundell* 1028. Champotón, *Flores* 7.

BRIT. HONDURAS: El Cayo, *Bartlett* 12948. Without locality, *Record* 7; *Castillo* 4.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 3356, 3568, 3612, 3732.

3. *Malpighia lundellii* Morton, sp. nov.

Arbor 6 m. alta, trunco ca. 12.5 cm. diametro; rami glabri, longitudinaliter striati, ramulis hornotinis flavido-sericeis; folia opposita, petiolata, petiolo brevi, vix 0.5 mm. longo, arcte sericeo, supra canaliculato, stipulata, stipulis minutis, subulatis, integris, ca. 1.5 mm. longis, plus minusve persistentibus, lamina foliorum ovali, usque ad 9 cm. longa et 3.5 cm. lata, apice rotundata vel retusa, sæpe mucronulata, basi obtusa, chartacea, supra sparse sericeo-strigosa, permox glabra, pallide viridi, venulis prominulis, subtus dense argentea-sericea, glandulis duobus minutis basin versus prædita; inflorescentia subumbellata, usque ad 4.5 cm. longa, pedunculo communi usque 2.3 cm. longo, tenuiter sericeo, bracteis geminis lanceolatis, acuminatis, ca. 2 mm. longis, sericeis, pedunculo florifero usque ad 7 mm. longo, sericeo, apice bibracteolato, bracteolis ovatis, ca. 1 mm. longis, basi latis, apice acutis, pedicellis quam pedunculo florifero longioribus, usque ad 9 mm. longis, tenuiter sericeis, sursum sensim incrassatis; calycis lobi ovato-lanceolati, ca. 3.5 mm. longi, glandulas 8 oblongas ca. 2.5 mm. longas basi plus minusve confluentes gerentes, apice liberi, et incurvi, strigosi, obtusi; petala rubra, ca. 10 mm. longa, longe unguiculata, ungue crasso, canaliculato, ca. 4 mm. longo, limbo orbiculari, concavo, dorso carinato, perspicue erosolacerato, utrinque glabro, eglanduloso, basi cuneato, petalo quinto subsimili; andrœceum zygomorphum, filamentis basi connatis, glabris, filamentis 2 petalis postico-lateralibus oppositis ceteris 8 multo crassioribus, antheris glabris; gynœceum zygomorphum, ovario pro parte sericeo, stylis glabris, 2 posticis quam antico directo longioribus, evidenter curvatis, apice uncinatis; baccæ non suppetunt.

Type in the U. S. National Herbarium, No. 1,586,346, collected at Betsy Croft, Belize River, British Honduras, June 8, 1933, by C. L. Lundell (No. 4083). Duplicate in the herbarium of the University of Michigan.

ADDITIONAL SPECIMENS EXAMINED:

BRIT. HONDURAS: Tiger Point, Northern River, *Gentle* 885. Orange Walk District, Winzerling I-15, VIII-6.

A peculiar species, probably most nearly related to *Malpighia incana* Miller, from which it may be distinguished by the characters given in the key. Mr. Winzerling's specimen I-15 has the note: "Tree looks like 'Red Fowl' but has no prickles, grows in clusters like logwood, in wet places near Pine Ridge. Has dull-like thorns [probably abortive branches]. Medium hard wood. Back of leaf silvery-grey in colour. Tree about 5 in. diam. and 20 ft. tall. Small red flowers." On the label for *Winzerling* VIII-6 the common name is given as "Hicatee plum."

4. *Malpighia incana* Mill.

This species was described from material cultivated from seeds said to have come from Campeche, but it has not since been found in that region. Niedenzu records it only from Cuba.

9. BUNCHOSIA Rich.

Ovary and style hairy; some of the petals glandular-toothed 1. *B. lanceolata*
 Ovary and style glabrous; petals eglandulose 2. *B. swartziana*

1. *Bunchosia lanceolata* Turcz.

Specimens of this species from the Yucatan Peninsula have usually been called *Bunchosia nitida* (Jacq.) Rich., a West Indian species, apparently not very closely related.

SPECIMENS EXAMINED:

BRIT. HONDURAS: All Pines, *Schipp* S-148. Kendal, *Schipp* 802. San Andrés, *Gentle* 7, 67; *Lundell* 4731, 4820. America's Estate, *Gentle* 118; *Lundell* 4947. Without locality, *Winzerling* V 21; *Gentle* 517.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 3499. Monte Polol, *Lundell* 3761.

The last two specimens differ in some respects from the others and may be referable to some other species. They are in very young bud only.

2. *Bunchosia swartziana* Griseb.

The specimens here cited have usually been identified as *Bunchosia glandulosa* (Cav.) Rich., a species confined to the West Indies. In fact, Niedenzu himself recorded *B. glandulosa* from Yucatan on the basis of *Gaumer* 411; but an examination of specimens of this number shows that they also are referable to *B. swartziana*, which belongs to a different subsection of the genus (*Xanthozeugma*). At the same time other Yucatan specimens were referred by Niedenzu to *B. swartziana* as a new variety (var. *yucatanensis* Ndzu.), but they seem to differ in no respect from typical West Indian material. Niedenzu also records *B. media* (Ait.) DC. from Yucatan on the basis of *Seler* 3942 and 3986. I have not seen these specimens, but it seems quite possible that they also will prove to be *B. swartziana*.

In the fruiting condition this species is not always easy to distinguish from *Bunchosia lanceolata*. Even at maturity the fruits of *B. lanceolata* bear a few persistent hairs, whereas those of *B. swartziana* are glabrous from the beginning. The two species sometimes differ in aspect also, the leaves of *B. swartziana* being usually smaller and yellowish-green.

SPECIMENS EXAMINED:

YUCATAN: Izamal, *Gaumer* 474, 23376. Tecal, *Gaumer* 23283. Valladolid, *Steere* 1656. Chichen Itza, *Steere* 1602; *Bequaert* 39. Progreso, *Flores* s. n. Without locality, *Schott* 84; *Valdez* 96; *Gaumer* 411, 23958, 24286.

BRIT. HONDURAS: Jacinto Hills, *Schipp* S-624, 1308. Corozal-Pachacan Road, *Gentle* 47; *Lundell* 4802. Xiabe, *Gentle* 838. Without locality, *Winzerling* X 2.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 2920, 3488, 3567, 3961. Sabana San Francisco, La Libertad, *Lundell* 2474.

10. BYRSONIMA Rich.

Leaves obovate, rounded at apex, short-petiolate; hairs of the torus much intertangled 1. *B. bucidæfolia*
 Leaves elliptic, lanceolate, or rarely obovate, usually acute, longer-petiolate; hairs of the torus straightish 2. *B. crassifolia*

1. *Byrsonima bucidæfolia* Standl.

SPECIMENS EXAMINED:

YUCATAN: Kancabconot, *Gaumer* 23869 (type). Without locality, *Gaumer* 23966, 24012, 24391.

BRIT. HONDURAS: Honey Camp, *Lundell* 353; *Meyer* 14, 18. Without locality, *Winzerling* 13.

2. *Byrsonima crassifolia* (L.) H.B.K.

This is a common and wide-spread species, varying greatly in leaf form and pubescence, which is excluded from the flora of continental North America by Niedenzu, who refers the specimens to *B. cotinifolia*, *B. pulchra*, *B. oaxacana*, *B. cumingiana*, and *B. laurifolia* var. *guatemalensis*. The characters used in distinguishing these do not seem constant in the material I have examined, indicating that they are merely forms of the variable *B. crassifolia*, as suggested by Standley in his description of *Byrsonima bucidæfolia*.

SPECIMENS EXAMINED:

YUCATAN: Cozumel Island, *Gaumer* 95. Kancabconot, *Gaumer* 23849, 23849 bis. Izamal, *Gaumer* 23836. Lake Chichancanab, *Steere* 2414. Chichen Itza, *Steere* 1543. Without locality, *Gaumer* 1083, 23996.

BRIT. HONDURAS: Mountain Pine Ridge, *Bartlett* 13055, 13114. Belize, *Bartlett* 11217. North of Baldy Sibun, *Kinloch* 78. Stann Creek Railway, *Schipp* 176. Roaring Creek, *Lundell* 388, 458. Belize-Sibun Road, *Gentle* 48. Corozal District, *Gentle* 334. Big Fall Pine Ridge, *Lundell* 4091, 4092. Without locality, *Klugge* 16; *Heyder* 47.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 2348, 2573, 3007. El Sos, *Lundell* 1648.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

IX

**THE GRASSES OF BRITISH HONDURAS
AND THE PETEN, GUATEMALA**

BY JASON R. SWALLEN

With four plates

[Issued April 24, 1936]

THE GRASSES OF BRITISH HONDURAS AND THE PETÉN, GUATEMALA ¹

INTRODUCTION

The first important collection of plants from British Honduras was made by M. E. Peck in 1905-07, in the Belize and Toledo Districts. Until very recently there have been no other collectors in the region. In 1928 and 1929, however, C. L. Lundell made extensive collections at Honey Camp, Orange Walk District; and H. P. Smart in the Belize, Stann Creek and Toledo Districts, in British Honduras. On recent Maya expeditions under the auspices of the Carnegie Institution of Washington and the University of Michigan, H. H. Bartlett in 1931 and C. L. Lundell in 1932 and 1933 obtained many specimens in the Belize and El Cayo Districts of British Honduras, and the Petén, Guatemala. For the past several years W. A. Schipp has collected in southern British Honduras, especially in the Stann Creek District. Additional collections were made by Sampson, Aguilar, Gentle, and others.

Only two papers have been published dealing with the grasses of this area. The first is "On the Gramineæ collected by Professor Morton E. Peck in British Honduras, 1905-1907" by F. Tracy Hubbard.¹ The second is "The Grasses of Central America" by A. S. Hitchcock.²

Numerous additions to the grass flora of our region have been found in the collections mentioned above since the latter work was published. Only four of these are new species: *Axonopus ciliatifolius*,³ *A. rhizomatosus*,³ *Panicum bartlettii*,⁴ and *Oryza alta* herein described.

Among the grasses, as in some other groups, there are species, such as *Oryza alta* and *Pennisetum nervosum*, which occur in British Honduras and, so far as known, in no other part of Central America. However, they are again found in northern South America and Brazil. It is probable that they also grow in the intervening countries but have not yet been discovered.

The pine ridges of British Honduras closely resemble the pine forests of the Southeastern Coastal Plain of the United States. The same pine, *Pinus caribæa*, is found in both localities. It is not surprising therefore to find that there are also grasses which are common to both regions. Several species of the *Dichanthelium* group of *Panicum*, so characteristic of the pine woods of the Southeastern States, also occur on the pine ridges of British Honduras.

¹ Proc. Amer. Acad. 49: 495. 1913.

² Contr. U. S. Nat. Herb. 24: 662. 1930.

³ Jason R. Swallen, *New Grasses from the United States, Mexico, and Central America*, Jour. Wash. Acad. Sci. 23: 458. 1933.

⁴ Jason R. Swallen, *The Grasses of the Yucatan Peninsula*, Carnegie Inst. Wash. Pub. No. 436, 334, 1934.

The grass flora is somewhat larger and more varied than that of the northern part of the Yucatan Peninsula. For the most part the species are those which are rather wide-spread through tropical and subtropical America. *Mesosetum filifolium* Hubb. and *Axonopus ciliatifolius* are apparently endemic in British Honduras. *Ichnanthus lanceolatus* is known only from the Yucatan Peninsula. A few others are confined to our region and the adjacent countries.

The economic grasses are those usually grown in the tropics, including maize (*Zea mays* L.), sugarcane (*Saccharum officinarum* L.), sorghum (*Sorghum vulgare* Pers.), Guinea grass (*Panicum maximum* Jacq.), and Pará grass (*Panicum purpurascens* Raddi). Lemon grass (*Cymbopogon citratus* (DC.) Stapf) is commonly planted.

Common names are included for the economic species and for any others that have acquired a significant local or native name. *Carrizo* is a term usually applied to any coarse woody grass, such as *Olyra latifolia* and species of *Lasiacis*.

Fifty-eight genera and one hundred and sixty-one species are included.

Through the courtesy of the directors, the specimens in the Gray Herbarium, and the herbaria of the New York Botanical Garden, the Field Museum, and the University of Michigan have been examined in the preparation of the manuscript.

KEY TO GENERA

Culms hard, woody.

Culms tall, erect, usually in large clumps.

Plants spineless; palea wingless on the keels..... 1. *Bambusa*

Plants spiny at the nodes; palea winged on the keels..... 2. *Guadua*

Culms widely spreading or clambering, not in large clumps.

Flowering branches numerous, in dense fascicles; spikelets racemose, subcylindrical, with 3 fertile florets..... 3. *Arthrostylidium*

Flowering branches not in dense fascicles; spikelets paniculate, subspherical, with 1 fertile floret..... 35. *Lasiacis* (*Panicææ*)

Culms herbaceous.

Spikelets in groups of 3 or 4, the groups racemose on a common axis, the first glumes indurate, forming a pitcher-shaped involucre 10. *Antheophora*

Spikelets not in groups with a pitcher-shaped involucre.

Spikelets with 2 or more perfect florets, if only one-flowered the spikelets sessile on one side of a continuous rachis. (See also *Zea* and *Tripsacum* with unisexual spikelets.)

Spikelets sessile or short pedicellate on one side of a continuous rachis (*Chlorideæ*).

Spikelets with one fertile floret.

Spikes racemose.

Culms coarse, tufted, erect; panicles spike-like; rachilla not prolonged..... 15. *Spartina*

Culms slender, erect or spreading; panicles open, the spikes spreading; rachilla prolonged.

Spikes elongate, slender; spikelets comparatively distant 16. *Gymnopogon*

Spikes short; spikelets crowded 18. *Bouteloua*

- Spikes digitate.
 Rudimentary florets obsolete; rachilla prolonged as
 a naked bristle.....14. *Cynodon*
 Rudimentary florets 1 or more, club-shaped.....17. *Chloris*
 Spikelets 2 to several-flowered.
 Spikes racemose.
 Spikes elongate with numerous spikelets.....11. *Leptochloa*
 Spikes very short, composed of a single 2-flowered
 spikelet and a rudimentary one reduced to
 awns.....19. *Pentarrhaphis*
 Spikes digitate.
 Rachis prolonged beyond the spikelets.....13. *Dactyloctenium*
 Rachis not prolonged.....12. *Eleusine*
 Spikelets in open or contracted panicles. (*Festuceæ*)
 Culms coarse, reedlike; rachilla hairy.....7. *Phragmites*
 Culms usually slender, not reedlike; rachilla glabrous.
 Lemmas firm, several-nerved.....6. *Distichlis*
 Lemmas membranaceous, 3-nerved.....5. *Eragrostis*
 Spikelets with one fertile floret and often one or more sterile
 or staminate florets below it. Spikelets sometimes uni-
 sexual. (Spikelets with two fertile florets in *Isachne* and
Ischaemum.)
 Spikelets unisexual.
 Fruit milky white, indurate.
 Panicles large, terminal, the pistillate spikelets on the
 upper branches and toward the ends of the lower
 ones, the staminate spikelets arranged on the lower
 part of the lower branches.....46. *Olyra*
 Panicles small, axillary, composed of a single terminal
 pistillate spikelet and several staminate spikelets
 below it. Terminal panicles, if any, wholly stami-
 nate.....47. *Lithachne*
 Fruit not milky white.
 Staminate and pistillate spikelets in the same inflores-
 cence.
 Spikelets distant, in pairs, appressed along the main
 panicle branches, the pistillate sessile, large, the
 staminate long-pedicellate, inconspicuous.....22. *Pharus*
 Spikelets approximate, the staminate in pairs on one
 side of the upper part of a continuous rachis, the
 pistillate solitary on opposite sides of the lower
 part of the same rachis.....57. *Tripsacum*
 Staminate and pistillate spikelets in separate inflor-
 escences.....58. *Zea*
 Spikelets perfect
 Imperfect florets none below the fertile one.
 Spikelets articulate below the glumes, flattened later-
 ally; glumes usually small or wanting (*Oryzæ*).
 Glumes small; lemmas awned (usually awnless in
O. sativa).....20. *Oryza*
 Glumes wanting; spikelets awnless.....21. *Leersia*
 Spikelets articulate above the well-developed glumes,
 not strongly laterally compressed. (*Agrostideæ*)
 Lemmas 3-awned; callus sharp-pointed.....9. *Aristida*
 Lemmas awnless; callus blunt.....8. *Sporobolus*
 Imperfect florets one (four in *Streptochaeta*), composed
 of a lemma, a reduced or fully developed palea and
 sometimes a staminate flower.
 Lemma with a long much contorted awn.....4. *Streptochaeta*

Lemma without a contorted awn.

Glumes membranaceous; fertile lemma indurate.
(Paniceæ.)

Spikelets subtended by bristles or enclosed in spiny burs.

Spikelets subtended by bristles.

Bristles persistent.....43. *Setaria*

Bristles deciduous, falling with the spikelet.....44. *Pennisetum*

Spikelets enclosed in spiny burs.....45. *Cenchrus*

Spikelets neither subtended by bristles nor enclosed in burs.

Spikelets arranged on one side of spike-like racemes.

Margins of fertile lemma thin, not inrolled.

Spikelets densely covered with long, tawny silky hairs.....25. *Trichachne*

Spikelets glabrous or pubescent but not long silky.....26. *Digitaria*

Margins of fertile lemma inrolled, indurate.

Rachilla joint and first glume adnate, forming a swollen ring-like callus.....30. *Eriochloa*

Rachilla joint and first glume neither adnate nor swollen.

Racemes solitary (see also *Paspalum*).

Spikelets sunken in the thick corky rachis.....27. *Stenotaphrum*

Spikelets not sunken in the rachis.

Rachis rather broadly winged, partially enfolding the glabrous spikelets; spikelets paired, but those of a pair rather distant, appearing as if solitary in a single row.....28. *Thrasya*

Rachis wingless; spikelets hispid, solitary, placed with the back of the fertile lemma turned away from the rachis.....29. *Mesosetum*

Racemes 2 to many.

Spikelets awned or awn pointed.

Spikelets hispid.....41. *Echinochloa*

Spikelets glabrous or pilose, not hispid.....40. *Oplismenus*

Spikelets awnless.

Fertile lemma with small wings at the base, these sometimes reduced to scars.....34. *Ichnanthus*

Fertile lemma wingless.

Back of the fertile lemma turned away from the rachis.....31. *Axonopus*

Back of the fertile lemma turned toward the rachis.
First glume present.....33. *Panicum*

First glume usually wanting (present sometimes in *P. langei*, occasionally in other species).....32. *Paspalum*

Spikelets paniculate. (See also *Echinochloa*.)

Spikelets villous with appressed or spreading hairs.

First glume obsolete; spikelets awnless.....24. *Leptocoryphium*

First glume minute; second glume and sterile lemma short awned.....42. *Tricholæna*

Spikelets glabrous or pubescent.

Fertile lemma with small wings at the base, these sometimes reduced to scars.....34. *Ichnanthus*

- Fertile lemma wingless.
- Spikelets with two fertile florets.....39. *Isachne*
- Spikelets with one fertile floret.
- Second glume inflated, saccate at the base; spikelets unsymmetrical.....36. *Sacciolepis*
- Second glume not inflated; spikelets symmetrical.
- First and second glumes equal, similar.....38. *Homolepis*
- First glume rarely more than half as long as second, not similar to it.
- Panicles dense, spikelike; spikelets acuminate37. *Hymenachne*
- Panicles open; spikelets obtuse to subacute.
- Spikelets with a tuft of woolly hairs on the tips; plants woody, clambering.....35. *Lasiacis*
- Spikelets without woolly hairs; plants herbaceous.....33. *Panicum*
- Glumes indurate or at least firmer than the lemmas.
- Spikelets solitary, arranged in panicles, lemmas as firm as the glumes23. *Arundinella*
- Spikelets paired, arranged in racemes, these solitary, paired, or numerous in a paniculate inflorescence; lemma hyaline.
- Racemes in a paniculate inflorescence.
- Panicle silky; spikelets awnless.
- Rachis continuous; spikelets unequally pedicellate48. *Imperata*
- Rachis breaking up at maturity; lower spikelet sessile, the upper pedicellate.....49. *Saccharum*
- Panicles not silky; spikelets awned.....53. *Sorghum*
- Racemes solitary or paired, sometimes aggregate in a large compound inflorescence.
- Culms simple with a single terminal erect raceme (sometimes more); awns plumose, 3 to 5 cm. long.....54. *Trachypogon*
- Culms branching, at least above; awns, if present, not plumose, usually less than 15 mm. long.
- Spikelets all perfect, alike.....55. *Ischæmum*
- Spikelets unlike, the lower sessile, perfect, the upper pedicellate, usually reduced.
- First glume of sessile spikelet enlarged, globular; spikelets awnless; plants annual56. *Hackelochloa*
- First glume of sessile spikelet neither enlarged nor globular; spikelets awned; plants annual or perennial.
- First glume sharply 2-keeled, at least toward the summit.
- Spikelets of lower pairs unlike, fertile and sterile.....50. *Andropogon*
- Spikelets of the lowermost pairs alike, staminate or neuter.....51. *Cymbopogon*
- First glume rounded on the back, the margins involute52. *Hyparrhenia*

1. BAMBUSA Retz. [as Bambos]

- 1.
- Bambusa vulgaris*
- Schrad.; Wendl. Coll. Pl. 2: 26. pl. 47. 1808.

The common cultivated bamboo of Asia is occasionally found in clearings. British Honduras. Belize District: Sibun River, *Gentle* 1513. Guatemala. Petén: La Libertad, *Lundell* 2647.

2. GUADUA Kunth

Several sterile specimens of a bamboo, which because of the long spines at the nodes probably belong to this genus, were collected in British Honduras.

BRITISH HONDURAS. Belize District: Belize River, *Lundell* 1954, 3870, 3871, 3873, 3875. Sibun River, *Gentle* 1514.

3. ARTHROSTYLIDIUM Rupr.

- 1.
- Arthrostylidium pittieri*
- Hack. Österr. Bot. Zeitschr. 53: 75. 1904.
- Carrizo, Tzenet, Fisga.*

Culms clambering, smooth, 3 to 6 mm. in diameter, the slender fertile branches in dense fascicles, as much as 40 cm. long; blades lanceolate, 7 to 12 cm. long, 7 to 15 mm. wide, glabrous, or pubescent beneath toward the base; racemes 5 to 10 cm. long, often 1-sided, the rachis glabrous; spikelets appressed, 12 to 20 mm. long with one sterile floret and usually three fertile ones; fertile lemma 1 cm. long, short awned. Wooded hillsides, Campeche, Guatemala and Costa Rica.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12154. Hiltun, *Lundell* 3591. La Libertad, *Aguilar* 11, 304.

4. STREPTOCHÆTA Schrad.

- 1.
- Streptochæta sodiroana*
- Hack. Österr. Bot. Zeitschr. 40: 113. 1890.

Perennial; culms erect, about 1 m. tall; blades flat, tessellate, rather thick, elliptic, acuminate pointed, 15 to 24 cm. long, 5 to 7 cm. wide, glabrous; spike dense, many flowered, about 30 cm. long; spikelets 1-flowered, articulated below the glumes, the short thick pedicels densely papillose hispid; empty bractlets 4, shorter than the spikelet; lemma indurate, gradually narrowed into an awn about 10 cm. long, much twisted and contorted toward the end, becoming tangled and holding the mature spikelet suspended from the axis. Wet forests, British Honduras to Panama. Also in Ecuador.

BRITISH HONDURAS. Toledo District: Temash River, *Schipp* S 961.

5. ERAGROSTIS Host

Panicles usually contracted, the branches ascending or appressed, floriferous to the base or nearly so.

Palea ciliate on the keels; panicles narrow, spikelike, interrupted below

1. *E. ciliaris*

Palea scabrous on the keels; panicles never spikelike.

Lemmas acuminate.

Plants annual

3. *E. maypurensis*

Plants perennial

4. *E. acutiflora*

Lemmas acute.

Plants annual, stoloniferous, widely spreading; panicles small, subcapitate

2. *E. hypnoides*

Plants perennial, erect; panicles large, the branches somewhat spreading 5. *E. domingensis*
 Panicles open, the very slender widely spreading branches naked below 6. *E. elliottii*

1. *Eragrostis ciliaris* (L.) R. Br. in Tuckey, Narr. Exp. Congo App. 478. 1818.

Annual; culms slender, tufted, usually decumbent at the base, mostly 10 to 30 cm. tall; blades 5 to 8 cm. long, 1 to 3 mm. wide, attenuate-pointed; panicles dense, spikelike, interrupted at the base, 3 to 8 cm. long; spikelets 2 to 3 mm. long, 6 to 10 flowered. Waste places, usually in sandy ground, in tropical regions of both hemispheres.

BRITISH HONDURAS. Corozal District: San Antonio, *Lundell* 4954. Orange Walk District: Honey Camp, *Lundell* 360, 597. Stann Creek District: Stann Creek, *Schipp* 888.

GUATEMALA. Petén: La Libertad, *Lundell* 2641; *Aguilar* 346. Lake Petén, *Lundell* 3855.

2. *Eragrostis hypnoides* (Lam.) B.S.P. Prel. Cat. N. Y. 69. 1888.

Annual, stoloniferous, forming dense mats; culms 5 to 10 cm. tall, blades 1 to 2 cm. long, stiffly spreading, flat or becoming loosely involute; panicles dense, subcapitate, 1 to 2 cm. long, nearly as broad; spikelets several to many flowered, pale, 5 to 12 mm. long; lemmas 1.5 to 2 mm. long, acute. Lake shores, stream banks, ditches, and wet places, United States to Brazil.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1592. Sibun River, *Peck* 413.

GUATEMALA. Petén: La Libertad, *Lundell* 2522.

3. *Eragrostis maypurensis* (H.B.K.) Steud. Syn. Pl. Glum. 1: 276. 1854.

Annual; culms erect from a decumbent base, 20 to 40 cm. tall; blades mostly basal, narrow, erect, involute pointed, hairy or subglabrous; panicles 8 to 12 cm. long, the short stiff branches appressed to widely ascending, pilose in the axils; spikelets short-pedicellate, 6 to 10 mm. long, spreading, pale, tinged with purple. Pine ridges, open ground, and waste places, Mexico to Brazil and Bolivia.

BRITISH HONDURAS. Belize District: Belize, *Bartlett* 11257. Sibun River, *Smart* 72. Maskall Pine Ridge, *Gentle* 1093. El Cayo District: Mountain Pine Ridge, *Bartlett* 11647. Stann Creek District: All Pines, *Schipp* 788.

4. *Eragrostis acutiflora* (H.B.K.) Nees, Agrost. Bras. 501. 1829.

Perennial; culms tufted, erect, 15 to 60 cm. tall; blades 5 to 20 cm. long, 2 to 4 mm. wide, acuminate, firm, sparingly pilose; panicles mostly 8 to 15 cm. long (rarely 30 cm.), the branches stiffly ascending, the axils pilose; spikelets crowded, short-pedicellate, appressed, 4 to 5 mm. long; lemmas acute or somewhat acuminate, about 2 mm. long. Open fields, ditches, and pine ridges, usually in wet places, British Honduras to Brazil and Bolivia.

BRITISH HONDURAS. Belize District: Bakers Pine Ridge, *Lundell* 3816. Manatee Lagoon, *Peck* 281, 281a. Gracie Rock, *Gentle* 1615. Stann Creek District: All Pines, *Schipp* 788.

GUATEMALA. Petén: La Libertad, *Lundell* 3605.

5. *Eragrostis domingensis* (Pers.) Steud. Syn. Pl. Glum. 1: 278. 1854. HAY GRASS.

Perennial; culms erect in rather large, loose clumps, 1 to 2 m. tall; blades flat to loosely involute, elongate, attenuate to a fine point, 2 to 5 mm.

wide at the base; panicles 20 to 45 cm. long, the branches ascending, densely flowered to the base or nearly so; spikelets 5 to 8 mm. long, appressed, the glumes acute, 1.5 mm. long. Coastal marshes, Yucatan, British Honduras, the West Indies, and Columbia. Very common in cleared mangrove swamps at Belize.

BRITISH HONDURAS. Belize District: Belize, *Lundell* 1880, 4722. Gracie Rock, *Gentle* 1614. Manatee Lagoon, *Peck* 69b. Stann Creek District: Middlesex, *Smart* 38, *Schipp* 206. Stann Creek, *Schipp* 894.

6. *Eragrostis elliottii* S. Wats. Proc. Amer. Acad. 25: 140. 1890.

Perennial; culms caespitose, erect, 45 to 60 cm. tall; panicles more than half the length of the culms; panicle branches widely spreading, naked below, few-flowered; spikelets 5 mm. long, on stiff, capillary, spreading pedicels; glumes purple-tinged, the florets pale. Pinelands, wet woods, and wet grassy savannas, southern United States to British Honduras and the West Indies.

BRITISH HONDURAS. Belize District: Bakers Pine Ridge, *Lundell* 3786. Manatee Lagoon, *Peck* 222a. El Cayo District: Little Cocquericot, *Lundell* 3880. Stann Creek District: New Town, *Schipp* 907.

6. DISTICHLIS Raf.

1. *Distichlis spicata* (L.) Greene, Bull. Calif. Acad. 2: 415. 1887.

Perennial; culms stiffly erect from scaly rhizomes; blades firm, distichous, becoming involute, stiffly spreading; panicles dense, the branches appressed; spikelets 8 to 9 flowered, distinctly flattened and keeled. Seashores and salt marshes near the coast, British Columbia, United States, Mexico, Cuba, British Honduras and western South America.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1623.

7. PHRAGMITES Trin.

1. *Phragmites communis* Trin. Fund. Agrost. 134. 1820. REED.

Perennial, stoloniferous, usually growing in colonies; culms tall, coarse, reed-like; blades firm, flat, attenuate-pointed, 1 to 2.5 cm. wide, the margins very scabrous; panicles as much as 50 cm. long, drooping; spikelets about 1.5 cm. long, the rachilla long-hairy; lemmas thin, acuminate, glabrous. Swamps and wet places throughout the temperate and subtropical regions.

BRITISH HONDURAS. Belize District: Northern River, *Gentle* 1027. Belize River, *Lundell* 3781. Stann Creek District: Stann Creek, *Schipp* 511.

GUATEMALA. Petén: Lake Petén, *Lundell* 3120. Lake Zotz, *Lundell* 3311.

8. SPOROBOLUS R. Br.

Creeping rhizomes numerous; panicles spikelike.....1. *S. littoralis*

Creeping rhizomes wanting; panicles open.

Spikelets 3 to 4 mm. long; lower sheaths densely ciliate.....2. *S. cubensis*

Spikelets 1.4 to 1.8 mm. long; sheaths not ciliate.

Panicle branches long and drooping, naked below; blades flat.....3. *S. buckleyi*

Panicle branches short, narrowly ascending, floriferous to the base;

blades involute4. *S. indicus*

1. *Sporobolus littoralis* (Lam.) Kunth, Rév. Gram. 1: 68. 1829.

Perennial; culms erect from widely creeping rhizomes, 50 to 70 cm. tall; blades distichous, flat at the base, involute pointed, usually not more than 10 cm. long; panicles spikelike, usually 6 to 10 cm. long, 0.5 to 1 cm. thick; spikelets 2.5 to 3 mm. long, the glumes acute, subequal, as long as the florets. Salt marshes and sandy seacoasts, southern Florida to Brazil.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 120. Stann Creek District: South Water Cay, *Sampson* 27.

2. *Sporobolus cubensis* Hitchc. Contr. U. S. Nat. Herb. 12: 237. 1909.

Perennial; culms densely tufted, erect, 30 to 60 cm. tall; lower sheaths crowded, dark brown, the margins densely felty-ciliate; blades flat or folded, mostly 10 to 20 cm. long, 2 to 4 mm. wide, tapering toward the base, narrower than the mouth of the sheath; panicles open, the short spreading branches whorled; spikelets 3 to 4 mm. long, the first glume half as long. Savannas, rocky slopes and pine ridges, British Honduras and the West Indies to Venezuela.

BRITISH HONDURAS. Belize District: Gracie Rock Pine Ridge, *Gentle* 1549. El Cayo District: Mountain Pine Ridge, *Bartlett* 11745. Toledo District: Yeacos Lagoon, *Peck* 694.

3. *Sporobolus buckleyi* Vasey, Bull. Torrey Club 10: 128. 1883.

Perennial, culms erect, 40 to 130 cm. tall; sheaths compressed, keeled, densely hairy on the collar; blades flat, 15 to 45 cm. long, 5 to 10 mm. wide, glabrous, the margins scabrous; panicles diffuse, as much as 50 cm. long, the slender drooping branches naked below; spikelets 1.4 mm. long. Moist woods, southern Texas, eastern Mexico and British Honduras.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4796. Orange Walk District: Honey Camp, *Lundell* 359.

4. *Sporobolus indicus* (L.) R. Br. Prodr. Fl. Nov. Holl. 170. 1810.

Perennial; culms in tough dense clumps about 1 m. tall; blades flexuous, attenuate to a very fine point; panicles narrow, 15 to 30 cm. long, the slender branches ascending; spikelets 1.8 mm. long, subsecund on the lower side of the branches. Open ground and waste places, Mexico and the West Indies to Colombia and Brazil.

BRITISH HONDURAS. Belize District: Belize, *Lundell* 3780. Gracie Rock, *Gentle* 1624.

9. *ARISTIDA* L.

- | | |
|---|--------------------------|
| Plants annual; culms not more than 25 cm. tall | 2. <i>A. capillacea</i> |
| Plants perennial; culms mostly 0.5 to 1 m. tall. | |
| Panicles dense, contracted; awns loosely spiral | 3. <i>A. recurvata</i> |
| Panicles open, at least toward the base; awns straight or arcuate. | |
| Panicle branches floriferous to the base; lateral awns well developed | 4. <i>A. orizabensis</i> |
| Panicle branches naked below; lateral awns minute | 1. <i>A. ternipes</i> |

1. *Aristida ternipes* Cav. Icon. Pl. 5: 46. 1799.

Perennial; culms tufted, erect, 50 to 100 cm. tall; blades flat, elongate, involute toward the tip, tapering into a fine point; panicles large, drooping, 1/3 to 1/2 the length of the culm, the branches naked below; spikelets ap-

pressed toward the ends of the rather stout scabrous branches; glumes 8 to 10 mm. long; lemma scabrous on the keel, the central awn subterete, straight or arcuate, 10 to 15 mm. long, the lateral awns usually less than 1 mm. long. Rocky hills and open usually dry places, Arizona and Cuba to Colombia.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 72.

2. *Aristida capillacea* Lam. Tabl. Encycl. 1: 156. 1791.

Annual; culms delicate, erect, freely branching at the base, 5 to 25 cm. tall; blades conduplicate, 1 to 5 cm. long, about 0.8 mm. wide, with scabrous margins; panicles usually tinged with purple, 2 to 8 cm. long, the capillary branches spreading, more or less flexuous, naked below, not more than 2 cm. long; glumes subequal, acuminate, 2.5 to 3 mm. long; lemma 2 mm. long, tapering into a slender, twisted column 1.5 to 2 mm. long; awns 5 mm. long, divergent. Open ground, Mexico to Brazil and Bolivia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11678.

3. *Aristida recurvata* H.B.K. Nov. Gen. & Sp. 1: 123. 1815.

Perennial; culms tufted, erect, 0.5 to 1 m. tall, glabrous; blades firm, flat, involute pointed, with thickened margins, 15 to 25 cm. long, 1.5 to 2.5 mm. wide, becoming curled and flexuous with age; panicles 10 to 30 cm. long, narrow, dense, erect, the short branches approximate, densely flowered, appressed; glumes equal, about 1 cm. long, acuminate, awn pointed; lemma 4 mm. long, the twisted column 2 to 3 mm. long; awns about 1 cm. long, loosely spiral, becoming implicate. Prairies and dry hillsides, British Honduras to Brazil.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11778, 11606.

4. *Aristida orizabensis* Fourn. Mex. Pl. Gram. 78. 1886.

Aristida pseudospadicea F. T. Hubb. Proc. Amer. Acad. 49: 500. 1913.

Perennial; culms slender, 0.5 to more than 1 m. tall, glabrous; blades more or less flexuous, flat or folded toward the base, becoming involute-pointed; panicles 15 to 30 cm. long, the branches distant, the upper appressed, the lower often spreading, usually less than 8 cm. long; spikelets appressed to the branches; glumes 8 to 10 mm. long, awn-pointed, the second a little longer than the first; lemmas 8 to 12 mm. long, the slender twisted beak 3 mm. long; awns 1 to 2.5 cm. long, about equally divergent, the central a little longer than the lateral ones. Savannas, thickets, and rocky hills, Mexico to Panama.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 31. El Cayo District: El Cayo, *Bartlett* 11518. Mountain Pine Ridge, *Bartlett* 11697, 11860. Stann Creek District: Middlesex, *Schipp* 892.

10. ANTHEPHORA Schreb.

1. *Antheophora hermaphrodita* (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891.

Annual; culms erect or decumbent at the base, branching, rooting at the lower nodes, 15 to 50 cm. tall; blades flat, 5 to 20 cm. long, 4 to 7 mm. wide; spikes erect, 5 to 10 cm. long; spikelets in groups of 4, the first glumes 5 to 7 mm. long, acute, indurate, forming a sessile, erect false involucre which

encloses the rest of the spikelets. Open sandy ground and waste places, tropical America.

BRITISH HONDURAS. Corozal District: Corozal, *Gentle* 139. Stann Creek District: New Town, *Schipp* 898.

11. LEPTOCHLOA Beauv.

Plants annual.

Sheaths sparsely pilose; spikelets 1 to 2 mm. long; racemes slender..... 1. *L. filiformis*

Sheaths glabrous or scabrous; spikelets 5 to 7 mm. long; racemes relatively thick 2. *L. uninervia*

Plants perennial 3. *L. virgata*

1. *Leptochloa filiformis* (Lam.) Beauv. Ess. Agrost. 71, 166. 1812.

Annual; culms slender to rather coarse, as much as 1 m. tall; sheaths sparsely papillose-pilose with weak spreading hairs; blades flat, lax, thin, 5 to 15 cm. long, 3 to 5 mm. wide; inflorescence nearly half the length of the culm with several to numerous lax, spreading racemes; spikelets minute, the glumes sometimes nearly as long as the spikelet. Fields and waste places, southern United States and the West Indies to Argentina.

GUATEMALA. Petén: La Libertad, *Aguilar* 203, 411.

2. *Leptochloa uninervia* (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 383. 1917.

Annual; culms erect, mostly 30 to 50 cm. tall, sparingly branching, glabrous; blades often elongate, attenuate, not more than 3 mm. wide; panicles 10 to 15 cm. long, the racemes stiff, ascending, rather densely flowered to the base; spikelets 5 to 7 mm. long, lead-colored; lemmas obtuse, apiculate, the lateral nerves more or less excurrent. Swamps, ditches, and wet places, southern United States to British Honduras; Peru to Argentina.

BRITISH HONDURAS. Belize District: Belize, *Smart* 46.

3. *Leptochloa virgata* (L.) Beauv. Ess. Agrost. 166. 1812.

Perennial; culms tufted, rather slender, 30 cm. to more than 1 m. tall; blades flat, acuminate, 10 to 20 cm. long, 4 to 12 mm. wide, the margins scabrous; sheaths glabrous; racemes numerous, somewhat aggregate, slender, ascending to drooping, tinged with purple, mostly 6 to 10 cm. long; spikelets 2.5 to 3 mm. long, the lemmas blunt, awnless, or rarely an occasional floret awned. Open ground, pine ridges, along stream and ditches, and in brushy places, Florida, Mexico, and the West Indies to Argentina.

BRITISH HONDURAS. Corozal District: Sartaneja, *Sampson* 46. Orange Walk District: Tower Hill Estate, *Karling* 1. Belize District: Sibun River, *Smart* 70. Gracie Rock, *Gentle* 1570. Manatee Lagoon, *Peck* 296. El Cayo District: El Cayo, *Bartlett* 11490. Stann Creek District: Middlesex, *Smart* 37; *Schipp* 886. Toledo District: Colombia, *Smart* 45, 49.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12760.

12. ELEUSINE Gaertn.

1. *Eleusine indica* (L.) Gaertn. Fruct. & Sem. 1: 8. 1788.

Annual; culms in small tough spreading clumps, somewhat decumbent at the base, 15 to 70 cm. tall, distinctly compressed; spikes 2 to several, 5 to 10 cm. long, digitate, usually with another a short distance below; spikelets few to several flowered, crowded, awnless. Warm regions of both hemispheres.

BRITISH HONDURAS. Corozal District: Santa Rita, *Lundell* 4846. Corozal, *Lundell* 4732. Belize District: Belize, *Lundell* 1943. Gracie Rock, *Gentle* 1632, 1644, 1645. Manatee Lagoon, *Peck* 43.

GUATEMALA. Petén: El Paso, *Lundell* 1602; Lake Petén, *Lundell* 3856; La Libertad, *Aguilar* 65.

13. DACTYLOCTENIUM Willd.

1. *Dactyloctenium aegyptium* (L.) Richt. Pl. Eur. 1: 68. 1890.

Annual; culms branching, radiate spreading, rooting at the nodes, the ascending ends mostly 20 to 40 cm. long; spikes 2 to 5, 1 to 3 cm. long, thick, digitate, the rachis produced beyond the spikelets in a stiff point; spikelets pectinate, crowded, the first glume with an awn about 1 mm. long; lemmas acuminate or awn pointed. Fields and waste places in tropical regions.

BRITISH HONDURAS. Corozal District: San Andres, *Lundell* 4907; without locality, *Gentle* 277, 278.

GUATEMALA. Petén: La Libertad, *Aguilar* 191, 205.

14. CYNODON Rich.

1. *Cynodon dactylon* (L.) Pers. Syn. Pl. 1: 85. 1805.

Perennial, stoloniferous, widely creeping; culms wiry, compressed, 10 to 40 cm. tall; spikes 4 to 5, digitate, slender, arcuate, 3 to 5 cm. long; spikelets 1 flowered, 2 mm. long. A common weed in open ground throughout warmer regions.

BRITISH HONDURAS. Corozal District: San Antonio, *Lundell* 4899. Belize District: Gracie Rock, *Gentle* 1622, 1625.

GUATEMALA. Petén: La Libertad, *Aguilar* 66.

15. SPARTINA Schreb.

1. *Spartina spartinae* (Trin.) Merr. U. S. Dept. Agr. Bur. Pl. Ind. Bull. 9: 11. 1902.

Perennial; culms usually in large, dense, hard clumps, as much as 1.5 m. tall, more or less glaucous; blades firm, involute, elongate, sharp pointed, glabrous; panicles spikelike, erect or somewhat curved, 25 to 40 cm. long; spikelets awnless. Rocky seashores and marshy places near the coast, southern United States, Mexico, British Honduras and Costa Rica. Common in cleared mangrove swamps at Belize.

BRITISH HONDURAS. Belize: Belize, *Lundell* 4718. Manatee Lagoon, *Peck* 130.

16. GYMNOPOGON Beauv.

1. *Gymnopogon spicatus* (Spreng.) Kuntze, Rev. Gen. Pl. 3²: 354. 1898.

Perennial; culms slender, erect or somewhat decumbent at the base, branching, mostly 40 to 70 cm. tall; blades flat, firm, stiffly spreading, 4 to 6 cm. long, 4 to 8 mm. wide; panicles 15 to 25 cm. long, with few to several slender ascending or finally spreading spikes, commonly 15 to 20 cm. long, spikelet bearing to the base, the spikelets on the lower half few, distant, rudimentary; spikelets 2-flowered, appressed to the rachis 4 to 5 mm. long; glumes acuminate pointed, scarcely awned; lemmas 3 mm. long, slender, with awns 8 to 12 mm. long. Pine flats and savannas, British Honduras and Guatemala; Venezuela and Brazil to Argentina.

BRITISH HONDURAS. Stann Creek District: All Pines, *Schipp* 787.

17. *CHLORIS* Swartz

Lemmas awnless, dark brown.....	1. <i>C. petraea</i>
Lemmas awned, pale or light brown.....	2. <i>C. ciliata</i>

1. *Chloris petraea* Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Perennial; culms distinctly flattened, glaucous, sparingly branched, sometimes stoloniferous, 0.5 to nearly 1 m. tall; blades flat or conduplicate, 5 to 15 cm. long, 3 to 5 mm. wide, glabrous; spikes 3 to 7, suberect, 6 to 10 cm. long; first glume notched, short awned. Open sandy land near the sea, southern United States and the West Indies to Panama.

BRITISH HONDURAS. Stann Creek District: South Water Cay, *Sampson* 26.

2. *Chloris ciliata* Swartz, Prodr. Veg. Ind. Occ. 25. 1788.

Perennial; culms densely tufted, erect, 40 to 60 cm. tall; blades flat, attenuate, involute pointed, the margins scabrous; spikes 3 to 5, ascending, flexuous, 4 to 7 cm. long; spikelets about 2.5 mm. long, the glumes entire, acute, the rudimentary floret inflated, saccate; lemma light brown, the margins conspicuously silky ciliate; awn 1 mm. long. Wet open ground, Texas and the West Indies to British Honduras. Also in Colombia.

BRITISH HONDURAS. Corozal District: Corozal, *Sampson* 38. Belize District: Gracie Rock, *Gentle* 1643.

18. *BOUTELOUA* Lag.1. *Bouteloua triæna* (Spreng.) Scribn. Proc. Acad. Phila. 307. 1891.

Perennial; culms very slender, branching, widely spreading; spikes numerous, usually secund on the elongated axis, composed of a single spikelet, the rachis sometimes produced beyond the spikelet; spikelets 1-flowered with a 3-awned rudiment, the awns about 1 cm. long; first glume about half as long as the second. Open ground and roadsides, southern Mexico and Guatemala.

GUATEMALA. Petén: Tayasal, Lake Petén, *Lundell* 3860.

19. *PENTARRHAPHIS* H.B.K.1. *Pentarrhaphis scabra* H.B.K. Nov. Gen. & Sp. 1: 178. pl. 60. 1816.

Perennial; culms slender, densely tufted, erect, sometimes geniculate below, 10 to 30 cm. tall; basal blades flat or involute, 3 to 5 cm. long, not more than 1 mm. wide, more or less flexuous, those of the culms about 1 cm. long; spikes mostly 8 to 12 in terminal and axillary racemes, the spikes 6 to 8 mm. long including the awns, composed of one 2-flowered spikelet and a group of 5 bristles below it, two of these being the bifid continuation of the rachis, two a rudimentary spikelet, and one the first glume of the perfect spikelet. Rocky ground, Mexico to Colombia.

GUATEMALA. Petén: Sabana Zis, in shallow soil on outcropping limestone, *Lundell* 3196.

20. *ORYZA* L.

Plants annual; spikelets usually awnless or nearly so.....1. *O. sativa*

Plants perennial; spikelets awned.

Spikelets 9 mm. long; awns 2 to 3 cm. long; glumes acuminate.....2. *O. alta*

Spikelets 5 mm. long; awns 1 to 2 cm. long; glumes acute.....3. *O. latifolia*

1. *Oryza sativa* L. Sp. Pl. 333. 1753. Arroz, RICE

Annual; culms erect, about 1 m. tall; blades mostly 20 to 40 cm. long, 1.5 cm. wide, flat, scabrous; panicles dense, becoming topheavy; spikelets 7 to 10 mm. long, hispid, usually awnless. Cultivated, sometimes persistent in old fields. Warmer regions of the world.

GUATEMALA. Petén: La Libertad, *Lundell* 3601.

2. *Oryza alta* Swallen sp. nov.

Oryza latifolia var. *grandispiculis* Chevalier, Rev. Bot. Appl. 12: 1027. 1932 (in part). Two specimens are cited, *Dahlgren* and *Sella* 60 collected at Boa Vista, Pará, Brazil, and *Morong* 949 collected near the Pilcomayo River, Paraguay. The first better fits the description.

Perennis; culmi erecti, 3-4 m. alti, glabri; vaginæ internodiis breviores, auriculatæ, marginibus hispido-ciliatæ; laminæ planæ, acuminatæ, 25-80 cm. longæ, 20 to 28 mm. latæ, scaberulæ, marginibus scabris; ligula membranacea, hispido-ciliata, 5 mm. longa; panicula 30-40 cm. longa, languida, ramis ad 15 cm. longis basi nudis; spiculæ 8-9 mm. longæ, appressæ; glumæ acuminatæ, lunatæ, 4 mm. longæ; lemma carina et marginibus hispidis; arista scabra 2-3 cm. longa.

Perennial; culms erect or leaning, 3 to more than 4 m. tall, glabrous; sheaths shorter than the internodes, auriculate, glabrous, the margins usually hispid-ciliate; ligule membranaceous, lacerate to hispid ciliate, 5 mm. long; blades flat, acuminate, 25 to 80 cm. long, 20 to 28 mm. wide, scaberulous, the margins scabrous-serrulate; panicles open, drooping, 30 to 40 cm. long, the branches rather distant, densely pilose in the axils, naked on the lower half, the lower whorled, as much as 15 cm. long; spikelets 8 to 9 mm. long, appressed on the short branchlets, the lateral short-pedicellate, the terminal long-pedicellate; glumes lunate, narrow, acuminate, 1-nerved, about half as long as the spikelet; lemma minutely pitted, hispid on the keels and margins, unsymmetrically narrowed at the summit to a short scabrous beak, terminating in a scabrous or somewhat appressed-hispid awn 2 to 3 cm. long; palea slightly longer than the lemma, similar in texture, terminating in a hispid beak about 1 mm. long.

Type in the U. S. Nat. Herb. Nos. 1614041 and 1614042, collected in water, margin of the Amazon at Obidos, Pará, Brazil, July 19-20, 1934, by *Jason R. Swallen* (No. 5116).

Swamps, margins of rivers and lakes, British Honduras, Brazil, and Paraguay.

BRITISH HONDURAS. Stann Creek District: Stann Creek, *Schipp* 889.

BRAZIL. Pará: Obidos, *Swallen* 5116. Boa Vista, Tapajos River, *Swallen* 3186; *Dahlgren* and *Sella* 60. Pará, *Myers* 2646.

PARAGUAY. Lake Ypacaray: *Hassler* 12602, 12602a.

3. *Oryza latifolia* Desv. Journ. de Bot. Desv. 1: 77. 1813.

Perennial; culms rather coarse, erect, mostly 1 to 2 m. tall, glabrous; blades mostly 30 to 50 cm. long, 1 to 3.5 cm. wide, rather thin, scabrous; panicles about 30 cm. long; spikelets 5 mm. long, appressed, hispidulous, the awns 1 to 2 cm. long or sometimes wanting. Ditches, marshes, and along rivers, British Honduras and the West Indies to Brazil.

BRITISH HONDURAS. Toledo District: Columbia River, *Sampson* 15.

21. *LEERSIA* Swartz

Panicles open, the long branches naked below; spikelets 2 mm. long.....1. *L. grandiflora*
 Panicles narrow, contracted, the short branches spikelet bearing nearly
 to the base; spikelets 3 mm. long.....2. *L. hexandra*

1. *Leersia grandiflora* (Doell) Prodoehl, Bot. Archiv Mez 1: 219. 1922.

Perennial; culms rather slender, erect, 1 to 2 m. tall; blades flat, 15 to 30 cm. long, 1 to 1.5 cm. wide (rarely as much as 2 cm.), scabrous, sometimes sparsely appressed hispid; panicles large and open, the slender drooping branches as much as 15 cm. long, spikelet-bearing toward the ends; spikelets 2 mm. long, sparsely hispid-scabrous. Shady banks and borders of streams, Mexico to Brazil.

BRITISH HONDURAS. El Cayo District: El Cayo, *Bartlett* 11450.

2. *Leersia hexandra* Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Perennial; culms slender, erect from a decumbent, creeping base, rooting at the lower nodes, 0.5 to more than 1 m. tall; blades flat, 10 to 20 cm. long, about 4 to 8 mm. wide, scabrous; panicles 8 to 12 cm. long, often tinged with purple, the branches narrowly ascending, spikelet-bearing to the base or nearly so; spikelets 3 mm. long; hispid. Swamps, wet ditches, and margins of rivers and lakes, southern United States and the West Indies to Argentina.

BRITISH HONDURAS. Stann Creek District: Middlesex, *Schipp* 912.

GUATEMALA. Petén: La Libertad, *Aguilar* 168. Lake Petén, *Dampf* 11.

22. *PHARUS* L.

Culms erect; fruit pubescent only at the summit.....1. *P. latifolius*
 Culms decumbent at the base, rooting at the lower nodes; fruit pubescent all over.....2. *P. parvifolius*

1. *Pharus latifolius* L. Syst. Nat. ed. 10. 2: 1269. 1759. JAX PLANT.

Perennial; culms erect, glabrous, 40 to 80 cm. tall; blades lanceolate, acuminate, narrowed to a petiolate base, 10 to 30 cm. long, 3.5 to 7 cm. wide, strongly reticulate veined; panicle 10 to 30 cm. long, the main axis terminating in a stout bristle 1 to 6 cm. long; branches usually 2 or 3, compound, stiffly spreading, disarticulating at maturity; pistillate spikelets about 1.5 cm. long, appressed, the fruit pubescent only toward the summit. Wet forests, British Honduras and the West Indies to Brazil.

BRITISH HONDURAS. Belize District: Prospecto-Maskall road, *Gentle* 890.

2. *Pharus parvifolius* Nash, Bull. Torrey Club 35: 301. 1908.

Perennial; culms decumbent at the base, rooting at the lower nodes, about 1 m. long; blades lanceolate, mostly 15 to 20 cm. long, 1.5 to 3 cm. wide; panicle 15 to 25 cm. long, similar to that of *P. latifolius*; pistillate spikelets 11 mm. long, the fruit plump, pubescent all over. Wet forests, Mexico and the West Indies to Brazil.

GUATEMALA. Petén: Yaxha-Remate road, *Lundell* 2014.

23. *ARUNDINELLA* Raddi

Sheaths hispid; blades 1 to 2 cm. wide.....1. *A. deppeana*
 Sheaths glabrous; blades 2 to 4 mm. wide.....2. *A. berteroniana*

1. *Arundinella deppeana* Nees in Steud. Syn. Pl. Glum. 1: 115. 1854.

Perennial; culms erect, 1 to 2.5 m. tall, the nodes appressed hispid; sheaths ascending hispid, especially toward the summit; blades flat, attenuate to a fine point, 25 to 50 cm. long, 1 to 2 cm. wide, glabrous, scabrous, or papillose-pilose, especially toward the base; panicles dense, 30 to 50 cm. long, about 10 cm. wide, the numerous branches ascending; spikelets 4 to 5 mm. long, short-pedicellate, overlapping, appressed; awns 1 cm. long, loosely twisted below, arcuate. Savannas, brushy slopes, and open banks, Mexico and the West Indies to Brazil.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 359. El Cayo District: El Cayo, *Bartlett* 12094. Mountain Pine Ridge, *Bartlett* 11583. Stann Creek District: All Pines, *Schipp* 791. Toledo District: Moho River, *Peck* 735.

2. *Arundinella berteroniana* (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917.

Perennial; culms tufted, rather slender, mostly 0.5 to 1 m. tall; sheaths glabrous or sparsely appressed hispid, the margins often ciliate; blades flat or often folded or involute, 10 to 25 cm. long, 2 to 4 mm. wide, glabrous or nearly so; panicles similar to those of *A. deppeana* but less dense and fewer flowered; spikelets 3 to 4 mm. long, the awns about 1 cm. long, loosely twisted below, arcuate. River banks, Mexico and the West Indies to Brazil.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1617. El Cayo District: Belize River, *Bartlett* 13138; El Cayo, *Bartlett* 11451.

24. LEPTOCORYPHIUM Nees

1. *Leptocoryphium lanatum* (H.B.K.) Nees, Agrost. Bras. 84. 1829. *Arrozillo*, *Pelillo*.

Perennial; culms slender, densely tufted, 0.5 to 1 m. tall; leaves somewhat crowded toward the base, the blades elongate, folded or involute, scabrous; panicles 6 to 15 cm. long, loose, the branches ascending; spikelets about 4 mm. long, densely pilose with pale, silky, appressed or spreading hairs. Open grassy plains, hillsides, and pine ridges, Mexico and the West Indies to Argentina. One of the dominant grasses of the savannas of central Petén.

BRITISH HONDURAS. Belize District: Belize River, *Lundell* 3872; *Smart* 34. Gracie Rock, *Gentle* 1650. Manatee Lagoon, *Peck* 137. Stann Creek District: All Pines, *Schipp* 793. Without locality, *Dunlop* in 1920.

GUATEMALA. Petén: La Libertad, *Lundell* 2287, 2288, 2393, 3670. Sabana Zotz, *Lundell* 3597.

25. TRICHACHNE Nees

1. *Trichachne insularis* (L.) Nees, Agrost. Bras. 86. 1829.

Perennial; culms erect or somewhat decumbent at the base, usually more than 1 m. tall; panicles dense, plume-like, silky, tawny, with narrowly ascending racemes. Open ground and waste places, Texas to Florida, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Northern River, *Sampson* 29.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12688.

26. *DIGITARIA* Heist.

- Rachis with scattered long spreading hairs; first glume obsolete or
 nearly so 1. *D. horizontalis*
 Rachis without long hairs; first glume well developed..... 2. *D. sanguinalis*

1. *Digitaria horizontalis* Willd. Enum. Pl. 92. 1809.

Annual; culms slender, branching, decumbent at the base and rooting at the lower nodes; leaves pilose; racemes subdigitate, few to several, slender, the rachis with a few long, spreading, delicate hairs, these sometimes nearly wanting; spikelets about 2 mm. long, the first glume obsolete. Waste places throughout tropical regions.

BRITISH HONDURAS. Belize District: Honey Camp, *Lundell* 361, 598. Manatee Lagoon, *Peck* 44. Gracie Rock, *Gentle* 1620, 1628. Stann Creek District: Mullin's River, *Smart* 69. New Town, *Schipp* 899.

GUATEMALA. Petén: El Paso, *Lundell* 1468.

2. *Digitaria sanguinalis* (L.) Scop. Fl. Carn. ed. 2. 1: 52. 1772.

Resembling *D. horizontalis*; racemes digitate, fewer, and stouter, the rachis without hairs; spikelets about 3 mm. long, the first glume minute but well developed. Open ground and waste places throughout the tropics and warmer temperate regions.

BRITISH HONDURAS. Belize District: Belize, *Lundell* 1879.

GUATEMALA. Petén: El Paso, *Lundell* 1534.

27. *STENOTAPHRUM* Trin.1. *Stenotaphrum secundatum* (Walt.) Kuntze, Rev. Gen. Pl. 2: 794. 1891.

Perennial, stoloniferous, widely creeping; culms compressed; sheaths keeled; blades short, flat, obtuse; racemes flat, terminal and axillary, 5 to 15 cm. long; spikelets in pairs, the lower sessile, the upper pedicellate, 4 to 6 mm. long; first glume small; second glume and sterile lemma equal, the sterile lemma usually with a palea or staminate flower. Southern United States and the West Indies to Argentina.

BRITISH HONDURAS. Corozal District: Pachacan Road, *Lundell* 4993. Stann Creek District: Stann Creek, *Schipp* 501.

28. *THRASYA* H.B.K.1. *Thrasya campylostachya* (Hack.) Chase, Proc. Biol. Soc. Washington 24: 115. 1911.

Perennial; culms slender, flattened, straggling, often more than 1 m. long, glabrous or pubescent below the more or less bearded nodes; blades flat, 6 to 20 cm. long, 4 to 10 mm. wide, glabrous to softly pubescent, the margins sometimes hispid; racemes solitary, terminal and axillary on slender long exserted peduncles; racemes arcuate, 4 to 8 cm. long, the rachis winged; spikelets paired, placed back to back, 2.5 to 3 mm. long, glabrous; first glume minute. Savannas, grassy hills and pine woods, Guatemala to Bolivia.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 70. El Cayo District: Mountain Pine Ridge, *Bartlett* 11584, 11825, 11861, 11928.

29. MESOSETUM Steud.

1. *Mesosetum filifolium* F. T. Hubb. Proc. Amer. Acad. 49: 494. 1913.

Peniculus angustifolius Swallen, Amer. Jour. Bot. 19: 581, fig. 1. 1932.

Mesosetum angustifolium Swallen, Jour. Wash. Acad. Sci. 23: 460. 1933.

Perennial; culms densely tufted, slender, erect, 25 to 45 cm. tall, the nodes pubescent; blades firm, involute, 5 to 9 cm. long, the uppermost much reduced, those of the innovations elongate; racemes solitary, 2 to 6 cm. long, the rachis more or less flexuous; spikelets solitary, rather distant, 5 mm. long; first glume 4.5 mm. long, tuberculate-ciliate on the lower half; second glume and sterile lemma equal, acute, tuberculate-ciliate in the upper half. Pine ridges, British Honduras.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1653. Manatee Lagoon, *Peck* 136. El Cayo District: Mountain Pine Ridge, *Bartlett* 11748. Great Southern Pine Ridge, *Sampson* 83. Stann Creek District: All Pines, *Schipp* 792.

30. ERIOCHLOA H.B.K.

1. *Eriochloa punctata* (L.) Desv.; Hamilt. Prodr. Pl. Ind. Occ. 5. 1825.

Perennial; culms ascending from a decumbent base, about 1 m. long, the nodes and the main axis of the panicle pubescent; blades flat, the margins scabrous; panicles mostly 10 to 15 cm. long, the branches narrowly ascending or appressed, the lower 3 to 5 cm. long; spikelets acuminate, 4 to 5 mm. long, appressed pilose; fruit 2 mm. long with a hispidulous awn 1 mm. long. Swamps and wet places, southern United States to Argentina.

BRITISH HONDURAS. Belize District: Belize, *Smart* 76.

31. AXONOPUS Beauv.

Rachis conspicuously hispid with stiffly spreading golden yellow hairs. 1. *A. aureus*
Rachis not hispid.

Plants stoloniferous; blades thin, usually more than 6 mm. wide. 2. *A. compressus*

Plants caespitose; blades firm, less than 5 mm. long.

Culms erect, from short scaly rhizomes.

Spikelets 2.5 to 3 mm. long; fruit pale. 3. *A. rhizomatosus*

Spikelets 2 to 2.3 mm. long; fruit dark brown. 4. *A. ciliatifolius*

Culms without rhizomes.

Racemes not more than 8 cm. long; spikelets 2 mm. long. 5. *A. purpusii*

Racemes 10 to 15 cm. long; spikelets 3 mm. long. 6. *A. poiophyllus*

1. *Axonopus aureus* Beauv. Ess. Agrost. 12. 1812.

Perennial; culms compressed, slender, branching, 0.5 to more than 1 m. tall; blades flat, firm, mostly 6 to 10 cm. long, 4 to 8 mm. wide; inflorescence usually long exserted, with few to several slender, subdigitate, ascending racemes; rachis stiffly hispid below the spikelets and on the margins with spreading golden yellow hairs; spikelets solitary, 1.3 mm. long, subobtusely, glabrous or nearly so. Dry savannas and open grassy hills, Puerto Rico and Central America to Brazil and Bolivia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11885.

2. *Axonopus compressus* (Swartz) Beauv. Ess. Agrost. 12. 1812.

Stoloniferous perennial; culms compressed, erect or ascending, 15 to 40 cm. long, the nodes pubescent; blades thin, flat, 5 to 15 cm. long, 6 to 8 mm. wide, more or less papillose-ciliate toward the base; racemes 2 to 5, usually

about 5 cm. long, ascending; spikelets 2 to 3 mm. long, acute, glabrous or somewhat appressed pubescent near the margins. Open fields, waste ground, and shady places, southern United States to Argentina.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1598. Toledo District: Temash River, *Schipp* 1370.

GUATEMALA. Petén: Monte Polol, *Lundell* 3762.

3. *Axonopus rhizomatosus* Swallen, Jour. Wash. Acad. Sci. 23: 458. 1933.

Perennial with short scaly rhizomes; culms caespitose, 45 to 85 cm. tall, with nodes pubescent; blades flat, as much as 25 cm. long, 1 to 4 mm. wide, the uppermost reduced, smooth or scaberulous, pilose toward the base; racemes 2 to 4, subdigitate, narrowly ascending, 5 to 13 cm. long; spikelets 2.5 to 3 mm. long, densely pilose near the margins; fruit pale or lead-colored. Open pine woods, Guatemala, Honduras, and British Honduras.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 464. Without locality, *Dunlop* in 1920.

4. *Axonopus ciliatifolius* Swallen, Jour. Wash. Acad. Sci. 23: 458. 1933.

Perennial, with short scaly rhizomes; culms densely tufted, erect, 50 to 70 cm. tall; blades flat, 7 to 16 cm. long, 1 to 2 mm. wide, pilose on both surfaces, the margins papillose-ciliate toward the base; racemes 2 to 5, ascending or appressed, 3 to 11.5 cm. long; spikelets 2 to 2.3 mm. long, glabrous or sparsely pubescent; fruit dark brown, smooth and shining. Known only from the type collection.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11746.

5. *Axonopus purpusii* (Mez) Chase, Jour. Wash. Acad. Sci. 17: 144. 1927.

Perennial; culms very slender, densely tufted, erect, 15 to 40 cm. tall; leaves crowded toward the base, only one about the midculm, this with elongated sheath and reduced blade; blades flat, conduplicate at the base, mostly 5 to 10 mm. long, 1 to 2 mm. wide, sparsely pilose, the margins scabrous; inflorescence terminal and axillary with 2 to 4 ascending racemes as much as 8 cm. long; spikelets 2 mm. long, stiffly pilose at the tip and near the margins. Wet savannas and open woods, Mexico to Argentina.

GUATEMALA. Petén: La Libertad, *Lundell* 2302, 3639, 3678. Sabana Zotz, *Lundell* 3594.

6. *Axonopus poiophyllus* Chase, Proc. Biol. Soc. Washington 24: 133. 1911.

Perennial, culms densely tufted, erect, as much as 80 cm. tall, the nodes appressed hispid; blades flat, conduplicate at the base, firm, erect or somewhat spreading, 10 to 20 cm. long, 2 to 5 mm. wide, glabrous; racemes 2 to 6, erect or ascending, 10 to 15 cm. long; spikelets acute, rather distant, 3 mm. long, finely pubescent. Grassy hills, Guatemala, Honduras and British Honduras.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11760.

32. PASPALUM L.

Rachis winged, about 2 mm. wide 1. *P. pectinatum*

Rachis wingless or only narrowly winged, not more than 1 mm. wide.

Racemes 2, conjugate (occasionally a third below).

Spikelets elliptic, acute. Plants stoloniferous 2. *P. vaginatum*

Spikelets ovate to subhemispheric.

Spikelets long-silky on the margins. Plants stoloniferous.....12. *P. conjugatum*
Spikelets not silky.

Plants annual; spikelets 1.3 mm. long.....10. *P. multicaule*

Plants perennial; spikelets more than 2 mm. long.

Spikelets orbicular with transverse bands of brown..... 4. *P. serpentinum*

Spikelets ovate, not banded..... 3. *P. notatum*

Racemes 1 to many, not conjugate.

First glume present in at least one of a pair of spikelets.

Spikelets 1.7 mm. long; culms decumbent spreading..... 5. *P. decumbens*

Spikelets 2.2 to 2.7 mm. long; culms erect.

Spikelets glabrous 6. *P. peckii*

Spikelets pubescent 7. *P. langei*

First glume wanting.

Fruit dark brown.

Plants annual; culms usually geniculate spreading.....17. *P. convexum*

Plants perennial; culms erect.

Culms 1 to 2 meters tall; blades firm, serrulate, 1 to 2
cm. wide.

Spikelets obovate, obtuse.....13. *P. virgatum*

Spikelets elliptic, acute.....14. *P. conspersum*

Culms 0.5 to 1 meter tall; blades rather thin, not serrulate,
3 to 10 mm. wide.....18. *P. plicatulum*

Fruit pale (dark at maturity in *P. orbiculatum*).

Racemes several to many; culms more than 1 m. tall.

Spikelets 1.5 mm. long, pubescent..... 8. *P. paniculatum*

Spikelets 2 to 2.4 mm. long, glabrous15. *P. millegrana*

Spikelets 4 to 4.5 mm. long, the margins glabrous to silky.....16. *P. fasciculatum*

Racemes 2 to 7; culms slender, not more than 70 cm. tall.

Second glume wanting.....19. *P. pulchellum*

Second glume well developed.

Spikelets 1.2 mm. long with raised margins; plants
stoloniferous11. *P. orbiculatum*

Spikelets 1.5 to 1.8 mm. long; plants tufted..... 9. *P. caespitosum*

1. *Paspalum pectinatum* Nees in Trin. Gram. Icon. 1: pl. 117. 1828.

Perennial; culms erect, densely tufted, as much as 1 m. tall; sheaths glabrous or some of them pilose toward the summit; blades linear, elongate, 2 to 4 mm. wide, narrowed at the base, densely villous, giving the entire plant a grayish appearance; racemes usually 2, approximate, 4 to 8 cm. long, densely villous at the base; rachis winged, about 2 mm. wide; spikelets broad, acute, 4.5 to 7 mm. long; second glume membranaceous, flat, the margins winged; sterile lemma conspicuously papillose-ciliate. Open rocky hillsides and savannas, British Honduras to Brazil.

BRITISH HONDURAS. El Cayo District, *Bartlett* 11743. Toledo District: Ycacos Lagoon, *Peck* 680.

2. *Paspalum vaginatum* Swartz, Prodr. Veg. Ind. Occ. 21. 1788.

Perennial; stoloniferous and with strong rhizomes; culms erect or ascending as much as 60 cm. tall; sheaths keeled, overlapping, with a dense tuft of hairs at the mouth; blades distichous, becoming involute, about 10 cm. long; racemes usually 2, conjugate, erect or ascending; spikelets 3 to 4 mm. long, acute. Seacoasts, tropics and subtropics of both hemispheres.

BRITISH HONDURAS. Corozal District: Corozal, *Gentle* 804. Belize District: Gracie Rock, *Gentle* 1621.

3. *Paspalum notatum* Flüggé, Monogr. Pasp. 106. 1810.

Culms erect from short stout rhizomes, 15 to 50 cm. tall; leaves crowded toward the base; racemes as much as 12 cm. long; spikelets solitary, 2.5 to 3.5 mm. long, smooth and shining. Open ground, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Belize, *Lundell* 1878. Gracie Rock, *Gentle* 1642.

4. *Paspalum serpentinum* Hochst.; Steud. Syn. Pl. Glum. 1: 22. 1854.

Perennial; culms tufted, erect, 55 to 65 cm. tall; sheaths pilose, the lower-most densely appressed villous; blades erect, flat, becoming involute, 10 to 20 cm. long, 1 to 3 mm. wide, papillose-pilose, the upper ones greatly reduced; racemes 2 (rarely 1) approximate, 4 to 6 cm. long, narrowly ascending; spikelets 2.5 mm. long, subcircular, variously spotted or lined with reddish brown. Wet sandy savannas, British Honduras and Trinidad to Brazil.

BRITISH HONDURAS. Belize District: Bakers Pine Ridge, *Lundell* 3879.

5. *Paspalum decumbens* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Perennial; culms freely branching, spreading or creeping, rooting at the lower nodes, 10 to 60 cm. long; blades flat, pubescent on both surfaces, mostly 4 to 8 cm. long, 5 to 8 mm. wide (rarely wider); peduncles slender, 1 to several from the uppermost sheath; racemes solitary, somewhat arcuate, 1 to 3.5 cm. long; spikelets paired, 1.7 mm. long, obovate, obscurely pointed, glabrous; first glume well developed, truncate; second glume shorter than the spikelet exposing the fruit. Thickets, moist banks and open ground, British Honduras and the West Indies to Brazil and Bolivia.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 110. Toledo District: Temash River, *Schipp* 1367, 1378.

6. *Paspalum peckii* F. T. Hubb. Proc. Amer. Acad. 49: 495. 1913.

Perennial; culms tufted, erect, about 75 cm. tall, the nodes sparsely pubescent; sheaths keeled, overlapping, glabrous except the pilose margins; blades long-acuminate, 14 to 30 cm. long, 5 to 8 mm. wide, sparsely puberulent on both surfaces; racemes 2 or 3, falcate, 6 to 13 cm. long, the rachis about 2 mm. wide; spikelets paired, 2.7 mm. long; first glume of the primary spikelet obsolete or nearly so, that of the secondary as much as half the length of the spikelet. Pine ridges, British Honduras.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 71 (type).

7. *Paspalum langei* (Fourn.) Nash, N. Amer. Fl. 17: 179. 1912. GRAMA.

Perennial; culms slender, tufted, 30 to 60 cm. or frequently as much as 1 m. tall, compressed; blades flat, 10 to 40 cm. long, 6 to 15 mm. wide, glabrous or pubescent, sparsely ciliate; racemes 2 to 5 (sometimes more), slender, spreading, rather distant, the rachis with a few long hairs at the base; spikelets in pairs, 2.2 to 2.6 mm. long, pubescent, glandular-spotted, the first glume usually well developed. Moist woods, Texas, Florida and the West Indies, to Venezuela.

BRITISH HONDURAS. El Cayo District: El Cayo, *Bartlett* 11488.

GUATEMALA. Petén: La Libertad, *Lundell* 3608, 3640, 3857. El Paso, *Lundell* 1552.

8. *Paspalum paniculatum* L. Syst. Nat. ed. 10. 2: 855. 1759.

Perennial; culms usually coarse in tough clumps, mostly about 1 m. tall; blades 1 to 2 cm. wide, rounded at the base, glabrous, scabrous or sparsely hispid; panicles pyramidal; racemes several to many, crowded, arcuate-ascending or spreading; spikelets crowded, in pairs, 1.5 mm. long, pubescent. Open ground, often a weed in cultivated places, Mexico and the West Indies to Argentina; also in West Africa, Society Islands and Australia.

BRITISH HONDURAS. Belize District: Manatee River, *Smart* 65. Manatee Lagoon, *Peck* 970. Stann Creek District: Middlesex, *Smart* 26. Toledo District: Toledo, *Peck* 542.

9. *Paspalum cæspitosum* Flügge, Monogr. Pasp. 161. 1810.

Perennial; culms in dense erect or spreading clumps, mostly 30 to 60 cm. tall, the leaves usually crowded toward the base; blades flat or loosely rolled, ciliate toward the base; racemes 3 to 6, remote, stiffly ascending or spreading, more or less arcuate; spikelets in pairs, 1.5 to 1.8 mm. long, sparsely appressed pubescent. Shady places in limestone soil and in sandy pinelands, southern Florida, Yucatan, Central America and the West Indies.

BRITISH HONDURAS. Orange Walk District: Honey Camp, *Lundell* 568. Belize District: Gracie Rock, *Gentle* 1597. Toledo District: Toledo, *Peck* 769.

GUATEMALA. Petén: La Libertad, *Lundell* 3858.

10. *Paspalum multicaule* Poir. in Lam. Encycl. Suppl. 4: 309. 1816.

Annual; culms densely tufted, freely branching, ascending or spreading, 10 to 45 cm. long; blades flat, 2 to 15 cm. long, 1.5 to 3 mm. wide, papillose-pilose, the midnerve and margins prominent; racemes 2, conjugate, divergent, mostly 2 to 4 cm. long; spikelets solitary, hemispheric, 1.3 mm. long, more or less beaded with subglobular hairs. Moist savannas and open ground, Mexico and Trinidad to Brazil and Bolivia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11779, 11859.

11. *Paspalum orbiculatum* Poir. in Lam. Encycl. 5: 32. 1804.

Stoloniferous perennial; culms slender, creeping, rooting at the nodes, the ascending branches 10 to 25 cm. long; blades flat, 1 to 6 cm. long, 1.5 to 7 mm. wide, glabrous or minutely pubescent; racemes 2 to 7, approximate, ascending to spreading, mostly 1 to 2 cm. (rarely as much as 3 cm.) long, the rachis winged, 0.5 mm. wide; spikelets ovoid, minutely pointed, 1 to 1.2 mm. long, glabrous or rarely pubescent, the margins somewhat raised. Moist sandy banks, open ground and along streams and ditches, southern Mexico and the West Indies to Paraguay.

BRITISH HONDURAS. Belize District: Freetown, *Smart* 74, 75. Gracie Rock, *Gentle* 1591. El Cayo District: El Cayo, *Bartlett* 11491. Toledo District: Toledo, *Peck* 541.

GUATEMALA. Petén: La Libertad, *Lundell* 2527, 2585.

12. *Paspalum conjugatum* Bergius, Act. Helv. Phys. Math. 7: 129, pl. 8. 1762.

Stoloniferous perennial; culms rather slender, flattened, glabrous, the flowering branches usually 20 to 50 cm. long; blades thin, flat, mostly 8 to 12 cm. long, 5 to 15 mm. wide, the margins scabrous or short ciliate;

racemes 2, conjugate, widely spreading, as much as 15 cm. long; spikelets solitary, 1.4 to 1.8 mm. long, ovate, minutely pointed, the margins silky-ciliate. Common weed, roadsides, waste ground along rivers and ditches and in cultivated fields, Florida to Texas, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4940. Stann Creek District: Big Creek, *Schipp* 895. Toledo District: Temash River, *Schipp* 1369. Punta Gorda, *Smart* 52.

GUATEMALA. Petén: La Libertad, *Aguilar* 141.

12a. *Paspalum conjugatum* var. *pubescens* Doell in Mart. Fl. Bras. 2^o: 55. 1877.

Differing from the species in having papillose-pubescent blades, usually longer racemes, and larger more ciliate spikelets as much as 2.2 mm long. Waste ground, Mexico and the West Indies to Brazil.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4940. Belize District: Gracie Rock, *Gentle* 1603.

13. *Paspalum virgatum* L. Syst. Nat. ed. 10. 2: 855. 1759.

Perennial; culms very coarse, in large dense clumps, simple, 1 to 2 m. tall; lower sheaths purple, spongy, reticulate; blades firm, flat, 30 to 75 cm. long, mostly 1 to 2 cm. wide, the margins serrulate; racemes usually 10 to 16, ascending to drooping, the lowermost usually 10 to 15 cm. long; spikelets in pairs, crowded, obovate, abruptly pointed, 2.5 to 3 mm. long, pubescent, especially at the summit; fruit chestnut brown, papillose striate. Open swampy ground, southern Texas and the West Indies to Brazil.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4957. Belize District: Belize, *Lundell* 1910. Northern River, *Gentle* 891. Stann Creek District: Big Creek, *Schipp* 883.

14. *Paspalum conspersum* Schrad.; Schult. Mant. 2: 174. 1817.

Perennial; culms erect in dense clumps, resembling *P. virgatum*; panicles erect, 15 to 25 cm. long, of 6 to 16 ascending to spreading or drooping racemes, 7 to 15 cm. long; margin of rachis scaberulous but with no long hairs; spikelets 2.7 to 3 mm. long, deep purple to rusty brown, usually softly pubescent; fruit chestnut-brown, papillose striate. Open, moist ground and along streams, Mexico to Argentina.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 69a. This specimen is exceptional in having glabrous spikelets.

15. *Paspalum millegrana* Schrad. in Schult. Mant. 2: 175. 1824.

Perennial; culms erect or ascending in large tough clumps, 1 to 2 m. tall, glabrous; lower leaves crowded toward the base; blades firm, flat, folded at the base, loosely rolled in drying, mostly 30 to 75 cm. long, 7 to 15 mm. wide, pubescent or glabrous above, scabrous beneath, the margins sharply serrulate; racemes several to many, approximate or somewhat distant, ascending or spreading, mostly 8 to 12 cm. long; spikelets in pairs, obovate, 2 to 2.4 mm. long, glabrous. Moist open ground, swamps and along ditches, British Honduras and the West Indies to southern Brazil.

BRITISH HONDURAS. Belize District: Belize, *Lundell* 3782. Manatee Lagoon, *Peck* 69.

16. *Paspalum fasciculatum* Willd.; Flügge, Monogr. Pasp. 69. 1810.

Stoloniferous perennial; culms branching, widely creeping, 2 to several meters long, compressed, glabrous; nodes glabrous to densely appressed-hairy; sheaths loose, about as long as the internodes; blades flat, elongate, 1.5 to 3 cm. wide, the margins scabrous; panicle flabellate, the numerous racemes 10 to 15 cm. long, crowded on a short axis; spikelets elliptic, pointed, 4 to 4.5 mm. long, glabrous to silky on the margins. River banks, swamps, and low ground, southern Mexico to Argentina.

BRITISH HONDURAS. Toledo District: Temash River, *Schipp* 1379.

17. *Paspalum convexum* Humb. & Bonpl. in Flügge, Monogr. Pasp. 175. 1810.

Annual; culms leafy, densely tufted, erect to geniculate spreading, 15 to 30 cm. tall; blades flat, rather lax, densely hairy, 8 to 15 cm. long, 4 to 10 mm. wide; racemes 2 or 3, 2 to 4 cm. long, erect or ascending; spikelets crowded, brown, obovate, usually 2.5 mm. long, pubescent. Open ground, cultivated fields and waste places, Mexico to Brazil.

GUATEMALA. Petén: La Libertad, *Aguilar* 317.

18. *Paspalum plicatulum* Michx. Fl. Bor. Amer. 1: 45. 1803. *Zacate Remolillo*.

Perennial; culms in small tufts, erect or ascending, mostly 0.5 to 1 m. tall; sheaths keeled; blades flat or folded, firm, as much as 50 cm. long, 3 to 10 mm. wide (usually 5 to 8 mm.), glabrous or papillose pilose, especially along the margins; racemes few to several, usually arcuate spreading, the rachis with a conspicuous tuft of hairs at the base; spikelets in pairs, 2.5 to 2.8 mm. long, glabrous or appressed pubescent, the sterile lemma cross-wrinkled near the margin; fruit dark brown, smooth and shining. Moist open ground or wood borders in clay or sandy soil, southern United States and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1678.

GUATEMALA. Petén: La Libertad, *Aguilar* 45; *Lundell* 2305, 3561.

19. *Paspalum pulchellum* Kunth, Mem. Mus. Hist. Nat. 2: 68. 1815.

Perennial; culms in small dense clumps, very slender, erect, 25 to 70 cm. tall; lower sheaths crowded, overlapping, the upper ones much shorter than the elongate internodes; blades flat, becoming involute, attenuate, as much as 20 cm. long, 1 to 2 mm. wide, pilose, the uppermost much reduced; racemes 2 to 4, 2 to 9 cm. long, erect or ascending, the rachis with a dense tuft of hairs at the base; spikelets 1.7 to 2 mm. long, solitary, the glumes wanting, the sterile lemma usually purple tinged. Sandy savannas and pine-lands, British Honduras, Guatemala and the West Indies to Brazil.

BRITISH HONDURAS. Belize District: Manatee Pine Ridge, *Gentle* 90. Manatee Lagoon, *Peck* 86. Baker's Pine Ridge, *Lundell* 3794.

GUATEMALA. Petén: Sabana Zotz, *Lundell* 3583.

33. PANICUM L.

Spikelets 2.5 to 3.5 mm. long.

Plants annual; spikelets brown, prominently reticulate-veined. 1. *P. fasciculatum*

Plants perennial; spikelets green or purple tinged, not reticulate-veined.

Fruit transversely rugose.

Culms erect, densely tufted; spikelets paniculate..... 5. *P. maximum*

- Culms widely spreading at base, geniculate, elongate;
 spikelets arranged on one side of spike-like racemes..... 3. *P. purpurascens*
- Fruit smooth.
- Creeping rhizomes present..... 7. *P. altum*
- Creeping rhizomes wanting.
- Spikelets glabrous (see also *P. tuerckheimii*).
- First glume broadly triangular, not more than one-fourth as long as the spikelet..... 4. *P. aquaticum*
- First glume acute, two-thirds as long as the spikelet.... 6. *P. ichnanthoides*
- Spikelets pubescent, sparsely hispid, or sparsely pilose.
- Spikelets acuminate, sparsely pilose..... 33. *P. tuerckheimii*
- Spikelets acute.
- Spikelets pubescent; first glume two-fifths as long as the spikelet; usually obtuse, glabrous; plants slender 23. *P. fusiforme*
- Spikelets sparsely hispid; first glume acute, three-fourths as long as the spikelet; plants coarse, robust 32. *P. rudgei*
- Spikelets not more than 2 mm. long.
- Spikelets short-pedicellate, arranged on one side of spike-like racemes.
- Blades lanceolate or ovate-lanceolate; culms creeping, rooting at the nodes.
- Fruit transversely rugose..... 2. *P. reptans*
- Fruit smooth.
- Sterile lemma with 2 prominent crateriform glands..... 14. *P. pulchellum*
- Sterile lemma not glandular..... 15. *P. frondescens*
- Blades linear.
- Rachis of racemes pilose; branchlets very short or wanting.
- Panicles more than 25 cm. long..... 10. *P. milleflorum*
- Panicles not more than 15 cm. long..... 9. *P. pilosum*
- Rachis of racemes not pilose; short branchlets usually numerous.
- Nodes glabrous.
- Blades narrowed at the base..... 11. *P. laxum*
- Blades cordate at the base..... 12. *P. boliviense*
- Nodes pubescent 13. *P. polygonatum*
- Spikelets paniculate.
- Panicles small, contracted, few flowered, on slender leafless branches from the upper nodes..... 8. *P. stenodoides*
- Panicles open, often large, many flowered, terminal on the main culm or leafy branches.
- First glume half as long as the spikelet or longer.
- Spikelets not more than 1.5 mm. long.
- Spikelets glabrous; blades 2 to 6 mm. long, glaucous.
- Culms erect; blades 3 to 6 cm. long, glabrous 21. *P. cyanescens*
- Culms decumbent, spreading; blades 1.5 to 2.5 cm. long, often pilose..... 20. *P. parvifolium*
- Spikelets papillose-hirsute; blades thin, 8 to 15 mm. wide 34. *P. hirtum*
- Spikelets 1.8 to 2 mm. long..... 19. *P. bartlettii*
- First glume much less than half as long as the spikelet.
- Culms widely spreading, freely branching.
- Culms viscid below the nodes; spikelets 2 mm. long. 31. *P. viscidellum*
- Culms not viscid below the nodes; spikelets not more than 1.5 mm. long.
- Spikelets glabrous.
- Panicles 10 cm. long; fruit sparsely silky..... 16. *P. schiffneri*
- Panicles 20 to 30 cm. long; fruit glabrous..... 18. *P. trichanthum*

- Spikelets pubescent 17. *P. trichoides*
 Culms tufted, sometimes decumbent at the base, but not
 widely spreading.
 Ligule prominent, 3 to 4 mm. long.
 Sheaths glabrous or appressed pubescent.
 Spikelets 1.2 mm. long 24. *P. longiligulatum*
 Spikelets not more than 1 mm. long 25. *P. wrightianum*
 Sheaths conspicuously pilose.
 Culms viscid below the nodes 31. *P. viscidellum*
 Culms not viscid 26. *P. olivaceum*
 Ligule less than 1 mm. long, sometimes nearly
 obsolete.
 Spikelets glabrous or nearly so.
 Blades cordate, 5 to 15 mm. wide 27. *P. sphærocarpon*
 Blades not cordate, usually less than 5 mm. wide.
 Spikelets 2 mm. long, strongly nerved, unsym-
 metrically pyriform 30. *P. lancearium*
 Spikelets 1.1 mm. long, not strongly nerved 29. *P. chamælonche*
 Spikelets pubescent.
 Blades papillose-ciliate; plants 10 to 20 cm. tall
 in soft dense tufts 22. *P. strigosum*
 Blades not papillose-ciliate 28. *P. albomarginatum*

1. *Panicum fasciculatum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Culms slender, branching, erect or decumbent at the base, 15 cm. to as much as 1 m. long; blades 5 to 15 cm. long, 0.5 to 1.5 cm. wide, glabrous or scaberulous; panicles 5 to 15 cm. long, the branches narrowly ascending to spreading; spikelets 2.5 to 3 mm. long, dark brown, often tinged with purple, glabrous, the second glume and sterile lemma reticulate-veined. Moist cultivated ground and waste places, Florida, Texas and the West Indies to Ecuador and Brazil.

BRITISH HONDURAS. Corozal District: San Andres, *Lundell* 4729, 4956. Santa Rita, *Lundell* 4848. Belize District: Manatee Lagoon, *Peck* 317. Gracie Rock, *Gentle* 1582. El Cayo District: Roaring Creek, *Lundell* 315. Stann Creek District: Middlesex, *Schipp* 374.

GUATEMALA. Petén: Lake Petén, *Lundell* 3859.

2. *Panicum reptans* L. Syst. Nat. ed. 10. 2: 870. 1759.

Annual; culms decumbent spreading, freely branching, the ascending branches 10 to 30 cm. tall; blades flat, cordate, acuminate, 1.5 to 6 cm. long, 4 to 12 mm. wide, the undulate white margins ciliate toward the base; panicles 2 to 6 cm. long, the branches stiffly ascending or spreading, 2 to 3 mm. long; spikelets 2 mm. long, the first glume short, rounded or truncate. Open ground and cultivated fields, tropical regions of both hemispheres.

GUATEMALA. Petén: El Paso, *Lundell* 1535.

3. *Panicum purpurascens* Raddi, Agrost. Bras. 47. 1823.

Panicum barbinode Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 256. 1834.

Culms coarse, as much as 6 m. long, decumbent at the base and rooting at the lower nodes, geniculate, the nodes densely villous; sheaths papillose-pilose; panicles 10 to 20 cm. long with several solitary or fascicled spreading racemes; spikelets 3 mm. long, pointed, usually tinged with purple. Moist

waste places and cultivated ground, Florida, Texas and the West Indies to Brazil and Peru. Frequently grown for forage.

BRITISH HONDURAS. Orange Walk District: Honey Camp, *Lundell* 594.

4. *Panicum aquaticum* Poir. in Lam. Encycl. Suppl. 4: 281. 1816.

Perennial; culms decumbent, rooting at the lower nodes, glabrous, the ascending ends mostly 20 to 40 cm. tall; blades flat, acute, usually stiffly spreading, 5 to 12 cm. long, 5 to 10 mm. wide; panicles about 10 cm. long, rarely larger, the branches rather stiffly ascending; spikelets appressed, 3 mm. long; first glume subacute, broad and clasping, about 1 mm. long. Margins of streams and ponds and in wet places, southern Mexico and Cuba to Paraguay.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1635.

5. *Panicum maximum* Jacq. Coll. Bot. 1: 76. 1786.

Culms erect in large clumps, 1 to 2.5 m. tall; blades flat, sometimes nearly 1 m. long, 1 to 3 cm. wide, glabrous or somewhat hirsute toward the base, the margins scabrous-serrate; panicles usually about 30 cm. long, the branches naked below, the lower whorled; spikelets 3 to 3.5 mm. long, glabrous, the first glume acute, one-third as long as the spikelet; fruit transversely rugose. Cultivated for forage, sometimes escaped. Florida, Mexico, and the West Indies to Bolivia and Brazil. Introduced from Africa.

BRITISH HONDURAS. Corozal District: San Antonio, *Lundell* 4949; *Gentle* 119. Belize District: Manatee Lagoon, *Peck* 195.

6. *Panicum ichnanthoides* Fourn. Mex. Pl. 2: 30. 1886.

Perennial; culms in large clumps, 1.5 to 2 m. tall, erect or decumbent at the base, smooth and hard; sheaths shorter than the internodes, pubescent on the margins; blades flat, elongate, 8 to 15 mm. wide, villous on the upper surface near the base; panicle 20 to 40 cm. long, the long slender branches ascending; spikelets 3.5 to 4.2 mm. long. Open rocky hillsides, southern Mexico, British Honduras and Nicaragua.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 73.

7. *Panicum altum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 488, f. 57. 1915.

Perennial; culms stout, reedlike, tangled, decumbent and straggling at the base, 2 to 4 m. tall, glaucous, sometimes with erect sterile branches at the swollen nodes; blades flat, 30 to 45 cm. long, 8 to 15 mm. wide, the margins scabrous; panicles narrowly ovoid, 20 to 30 cm. long, the slender scabrous branches fascicled, ascending to spreading, some naked at the base; spikelets short-pedicellate, 3.2 to 4 mm. long, turgid; glumes and sterile lemma strongly nerved, gaping, the first glume two thirds the length of the spikelet. Marshes near the seacoast, British Honduras to Trinidad.

BRITISH HONDURAS. Orange Walk District: Honey Camp, *Meyer* 110. Belize District: Manatee Lagoon, *Peck* 123.

8. *Panicum stenodoides* F. T. Hubb. Proc. Amer. Acad. 49: 497. 1913.

Perennial; culms densely tufted, slender, erect, 20 to 40 cm. tall, with slender, leafless panicle-bearing branches from the upper nodes; sheaths papillose-pilose, the lowermost bladeless, becoming fibrous; blades erect, involute toward the tip, 3 to 8 cm. long, 1 to 2 mm. wide, papillose-pilose

or sometimes glabrous; panicles short-exserted, about 1 cm. long, narrow, bearing 3 to 7 appressed spikelets; spikelets 2 to 2.1 mm. long, attenuate at the base; first glume half as long as the spikelet. Moist open grassland, British Honduras, Costa Rica, Panama, Trinidad, and Brazil.

BRITISH HONDURAS. Toledo District: Ycacos Lagoon, *Peck* 681.

9. *Panicum pilosum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Culms erect, or decumbent at the base and rooting at the lower nodes, branching, 25 to 60 cm. or sometimes as much as 1 m. long; nodes densely bearded; blades lanceolate 5 to 15 cm. long, 6 to 10 mm. wide; panicles erect, 8 to 15 cm. long, the branches simple, 1 to 4 cm. long, usually stiffly and abruptly spreading, papillose-hispid, the hairs sometimes sparse; spikelets 1.3 to 1.5 mm. long, crowded. Open woods, Mexico and the West Indies to Brazil.

BRITISH HONDURAS. Corozal District: San Andres, *Lundell* 4854; *Gentle* 66. Orange Walk District: Tower Hill Estate, *Karling* 15. Honey Camp, *Lundell* 541. El Cayo District: San Antonio, *Bartlett* 13044. Mountain Pine Ridge, *Bartlett* 11624. Belize District: Manatee River, *Smart* 67. Manatee Lagoon, *Peck* 28. Gracie Rock, *Gentle* 1596. Prospecto, *Gentle* 888. Stann Creek District: Stann Creek, *Smart* 29. Toledo District: Punta Gorda, *Smart* 51, 53. Temash River, *Schipp* 1371.

GUATEMALA. Petén: La Libertad, *Lundell* 3854; *Aguilar* 8.

10. *Panicum milleflorum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 494, f. 70. 1915.

Resembling *P. pilosum* but larger; sheaths sparsely papillose-pilose; blades lanceolate-acuminate, 15 to 35 cm. long, 12 to 20 mm. wide, the margins scabrous; panicles 25 to 45 cm. long, the lower branches in rather distant fascicles, ascending, with numerous short branchlets, the upper ones spreading, simple; spikelets 1.3 mm. long. Swampy places, British Honduras to Brazil.

BRITISH HONDURAS. Belize District: Manatee River, *Smart* 62.

11. *Panicum laxum* Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Culms erect or straggling, the nodes glabrous; blades as much as 25 cm. long, mostly 5 to 10 mm. wide, rounded but not cordate at the base; panicles 5 to 20 cm. long, rarely longer, the branches ascending to spreading, usually densely flowered, scabrous, with branchlets at the base as much as 1 cm. long; spikelets 1 to 1.5 mm. long, pointed. River banks, ditches, and moist places, Mexico and the West Indies to Paraguay.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 60. El Cayo District: El Cayo, *Bartlett* 11489. Stann Creek District: New Town, *Schipp* 905.

GUATEMALA. Petén: La Libertad, *Lundell* 2526, *Aguilar* 45½.

12. *Panicum boliviense* Hack. Repert. Sp. Nov. Fedde 11: 19. 1912.

Resembling large plants of *P. laxum*; blades cordate at the base, acuminate pointed, 8 to 15 cm. long, 7 to 20 mm. wide; panicles 10 to 20 cm. long, loosely flowered, the branchlets spreading, usually secund on the lower side of the ascending branches; spikelets 1.5 mm. long, glabrous, rather blunt. River banks, ditches and open woods, southern Mexico and Cuba to Paraguay.

BRITISH HONDURAS. Toledo District: Temash River, *Schipp* 1372.

GUATEMALA. Petén: El Paso, *Lundell* 1474. The specimens of this collection are more slender with narrower blades than typical *P. boliviense*. Usually the blades are 1.5 to 2 cm. wide, while these are 7 to 12 mm. wide.

13. *Panicum polygonatum* Schrad. in Schult. Mant. 2: 256. 1824.

Perennial; culms slender, widely creeping, the nodes pubescent; blades rather thin, cordate, lanceolate, mostly 5 to 8 cm. long, 5 to 10 mm. wide, the margins scabrous; panicles open, loosely flowered, the branchlets appressed or spreading, usually secund along the lower side of the branches. River banks and moist places along roads and in open woods, Mexico to Paraguay.

BRITISH HONDURAS. Toledo District: San Pedro, *Smart* 44.

14. *Panicum pulchellum* Raddi, Agrost. Bras. 42. 1823.

Perennial; plants rather delicate, widely creeping, rooting at the pubescent nodes, the slender fertile branches ascending or erect; sheaths much shorter than the internodes, more or less pilose, the margins ciliate; blades obovate, asymmetrical, 1.5 to 5 cm. long, 8 to 18 mm. wide (commonly 2 to 4 cm. long and 1 to 1.5 cm. wide), pilose to nearly glabrous; panicles 3 to 10 cm. long, the branches usually 1 to 1.5 cm. long, distant, stiffly spreading, spikelet-bearing from the base; spikelets 2 mm. long, pilose, the back of the sterile lemma with two crateriform glands. Shady banks, moist thickets, and woods, southern Mexico and Windward Islands to Brazil.

BRITISH HONDURAS. Belize District: Gracie Rock, *Gentle* 1539. Manatee Lagoon, *Peck* 279. El Cayo District: El Cayo, *Bartlett* 11443. Stann Creek District: Big Creek, *Schipp* 180, 884.

GUATEMALA. Petén: La Libertad, *Lundell* 2120, 2545; *Aguilar* 185.

15. *Panicum frondescens* Meyer, Prim. Fl. Esseq. 56. 1818.

Perennial; culms slender, widely creeping, rooting at the nodes, freely branching, the branches erect or ascending, mostly 15 to 30 cm. tall; blades lanceolate, acuminate, 5 to 11 cm. long, mostly 10 to 12 mm. wide (rarely more than 15 mm.); panicles 4 to 11 cm. long, the numerous crowded racemes densely flowered, becoming spreading, 10 to 25 mm. long; spikelets 2.7 mm. long. Shady river banks, swamps, and moist places, Mexico to Brazil.

BRITISH HONDURAS. Toledo District: Temash River, *Schipp* 1377.

16. *Panicum schiffneri* Hack. Ergeb. Bot. Exped. Akad. Wiss. Südras. 11. 1906.

Perennial; culms 2 to 3 m. long, straggling or clambering, freely branching, rooting at the nodes, pilose below the nodes or nearly glabrous; blades 5 to 15 cm. long, 1 to 2.5 cm. wide, sparsely pilose, the margins scabrous; panicles pyramidal, about 10 cm. long, the branches ascending to spreading, the lower ones naked below; spikelets 1.5 mm. long, densely clustered on the short branchlets; fruit sparsely silky. Wet shady banks, southern Mexico and the West Indies to Brazil.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12209.

17. *Panicum trichoides* Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

Annual; culms slender, freely branching, widely creeping; blades thin, ovate-lanceolate, 4 to 7 cm. long, 8 to 15 mm. wide, ciliate at the base;

panicles open, 8 to 15 cm. long, the ascending to spreading branches with capillary, few-flowered, spreading branchlets; spikelets 1.5 mm. long, pubescent, the fruit exposed at the summit. Woods and open ground, especially along trails, Mexico and the West Indies to Peru and Brazil.

BRITISH HONDURAS. Belize District: Belize River, *Lundell* 3864. Manatee River, *Smart* 66. Manatee Lagoon, *Peck* 314. Gracie Rock, *Gentle* 1571. El Cayo District: El Cayo, *Bartlett* 11447. Toledo District: Toledo, *Peck* 637.

18. *Panicum trichanthum* Nees, Agrost. Bras. 210. 1829. *Sooc*.

Perennial; culms erect or decumbent, sometimes clambering over brush, branching; blades lanceolate, 8 to 12 cm. long, 1 to 2.5 cm. wide, subcordate at the base; panicles diffuse, 20 to 30 cm. long, nearly as broad, the branches widely and rather stiffly spreading at maturity; spikelets long-pedicellate, glabrous, 1.2 to 1.4 mm. long, the first glume one fifth as long. River banks, lake shores, moist thickets and swampy places, Mexico and the West Indies to Paraguay.

BRITISH HONDURAS. Belize District: Big Falls, Manatee River, *Smart* 68. Toledo District: Columbia Branch, Rio Grande, *Smart* 42.

GUATEMALA. Petén: El Paso, *Lundell* 1538. Lake Zotz, *Lundell* 3307. Monte Santa Teresa, *Lundell* 2760.

19. *Panicum bartlettii* Swallen, Carnegie Inst. Wash. Pub. No. 436: 346. 1934.

Closely resembling *Panicum trichanthum*; spikelets 1.8 to 2 mm. long, pointed; first glume obtuse or subacute, half as long as the spikelet. Woods and river bluffs, Mexico (Vera Cruz and Campeche), British Honduras and Guatemala.

BRITISH HONDURAS. Belize District: Maskall, *Gentle* 1070. Gracie Rock, *Gentle* 1601. Manatee Lagoon, *Peck* 775. El Cayo District: El Cayo, *Bartlett* 11452, 11983, 12016. Little Cocquericot, *Lundell* 3868, 3876. Toledo District: Toledo, *Peck* 775.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12245. La Libertad, *Aguilar* 378.

20. *Panicum parvifolium* Lam. Tabl. Encycl. 1: 173. 1791.

Perennial; culms very slender, freely branching, decumbent at the base and rooting at the lower nodes; sheaths much shorter than the internodes, pilose with stiffly ascending or spreading hairs; blades glaucous, mostly 1.5 to 2.5 cm. long, 2 to 4 mm. wide, often pilose; panicles 2 to 4 cm. long, nearly as broad, the branches spreading, rather few-flowered; spikelets long-pedicellate, 1.5 mm. long, the first glume broad, subacute, two-thirds as long as the spikelet. Ravines, river banks, margins of ponds and wet open places, Costa Rica, British Honduras and the West Indies to Paraguay.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11612.

21. *Panicum cyanescens* Nees; Trin. Gram. Pan. 202. 1826.

Perennial; culms erect, densely tufted, 30 to 50 cm. tall; blades 3 to 6 cm. long, 2 to 6 mm. wide, glaucous, ascending or appressed, smooth or scaberrulous; panicles usually 4 to 5 cm. long, as much as 6 cm. wide; spikelets 1.5 mm. long, subglobose; first glume rounded or subacute, two thirds as long as the spikelet. Moist sandy ground, swamps and wet savannas, British Honduras, Cuba, and Trinidad to Brazil.

BRITISH HONDURAS. Belize District: Baker's Pine Ridge, *Lundell* 3783. Belize, *Bartlett* 11232. Manatee Lagoon, *Peck* 271.

22. *Panicum strigosum* Muhl. in Ell. Bot. S. C. & Ga. 1: 126. 1816.

Perennial; culms in dense, soft, spreading tufts, mostly 10 to 20 cm. tall; sheaths glabrous, the margins ciliate; blades thin, bright green, 2 to 5 cm. long, 3 to 6 mm. wide, conspicuously papillose-ciliate on the margins, otherwise nearly glabrous; panicles 2 to 5 cm. long, the axis pilose, the branches stiffly ascending or spreading; spikelets 1.3 to 1.5 mm. long; first glume rounded, 0.5 mm. long. Sandy woods and moist open ground, southeastern United States, Mexico, and the West Indies to Colombia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11592, 11635.

23. *Panicum fusiforme* Hitchc. Contr. U. S. Nat. Herb. 12: 222. 1909.

Perennial; culms tufted, erect, 30 to 50 cm. tall; blades linear, flat, 6 to 15 cm. long, 2 to 4 mm. wide, narrowly ascending, glabrous or nearly so; panicle branches ascending; spikelets 3 to 3.5 mm. long, fusiform, pubescent; first glume somewhat remote, 1.5 mm. long, acute. Autumnal phase becoming branched and somewhat top-heavy with slender involute blades. Pine woods and open ground, southeastern United States, British Honduras, Cuba, and Jamaica.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 453a. El Cayo District: Mountain Pine Ridge, *Bartlett* 11590, 11780.

24. *Panicum longiligulatum* Nash, Bull. Torrey Club 26: 574. 1899.

Perennial; culms 30 to 70 cm. tall, slender or rather stout, erect or ascending; ligule 3 mm. long; blades 4 to 8 cm. long, 4 to 8 mm. wide, glabrous above, minutely pubescent beneath; panicles 3 to 8 cm. long, the branches rather densely flowered, ascending; spikelets 1.2 mm. long, pubescent. Autumnal phase spreading or reclining with reduced panicles and small, more or less involute blades. Pineland and swamps, southeastern United States, Hispaniola and British Honduras.

BRITISH HONDURAS. Belize District: Sibun River, *Bartlett* 11397. Stann Creek District: Stann Creek Valley, *Kinloch* 191.

25. *Panicum wrightianum* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 44, f. 4. 1898.

Perennial; culms densely tufted, slender, spreading, becoming decumbent, about 20 cm. tall or sometimes taller; ligule 2 to 3 mm. long; blades flat, 2 to 4 cm. long, 2 to 4 mm. wide, minutely pubescent below, short-pilose to nearly glabrous above, the margins scabrous; panicles 2 to 3 cm. long (or as much as 6 cm.), the branches ascending; spikelets long-pedicellate, 1 mm. long, pubescent. Autumnal phase bushy branched with scarcely reduced blades and panicles. Moist sandy or mucky soil, southeastern United States, Cuba, and British Honduras.

BRITISH HONDURAS. Belize District: Belize, *Bartlett* 11256.

26. *Panicum olivaceum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 225, f. 234. 1910.

Perennial; culms erect or decumbent at the base, papillose-pilose, the nodes bearded; blades olive green, mostly 4 to 6 cm. long, 5 to 8 mm. wide, softly pubescent, the margins ciliate; ligule 3 to 5 mm. long; panicles usually

4 to 5 cm. long, the branches spreading, the axils densely pubescent or pilose; spikelets 2 mm. long, pubescent; autumnal phase freely branching, decumbent-spreading, the blades and panicles reduced. Fields, dry open ground, and open woods, Mexico to Colombia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11621.

27. *Panicum sphærocarpon* Ell. Bot. S. C. & Ga. 1: 125. 1816.

Perennial; culms densely tufted, erect or somewhat spreading, 15 to as much as 50 cm. tall; ligule obsolete or nearly so; blades cordate, light green, 4 to 10 cm. long (rarely longer), 5 to 15 mm. wide, the white cartilaginous margins papillose-ciliate toward the base; panicles mostly 5 to 10 cm. long, loosely flowered, the axis, branches, and pedicels viscid; spikelets subspherical, 1.7 mm. long, pubescent. Autumnal phase sparingly branched, spreading, the blades and panicles not greatly reduced. Sandy or gravelly banks, roadsides, and open woods, eastern United States, Cuba, and Mexico to Venezuela.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 61. El Cayo District: Mountain Pine Ridge, *Bartlett* 11714a.

28. *Panicum albomarginatum* Nash, Bull. Torrey Club 24: 40. 1897.

Perennial; culms slender, erect, wiry, mostly 30 to 40 cm. tall; blades 4 to 6 cm. (rarely 8 cm.) long, 4 to 6 mm. wide, glabrous or nearly so, the conspicuous white cartilaginous margins scabrous; ligule less than 1 mm. long; panicles usually about 4 cm. long; spikelets 1.5 mm. long, pubescent. Autumnal phase bushy branched with reduced blades and panicles. Sandy woods, southeastern United States, British Honduras, Guatemala, and Cuba.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11591, 11602, 11613, 11632, 11782.

29. *Panicum chamælonche* Trin. Gram. Pan. 242. 1826.

Perennial; culms densely tufted, erect or ascending, 15 to 20 or 30 cm. tall, glabrous; ligule very short; blades 3 to 5 cm. long, 2 to 3 mm. wide, often involute pointed; panicles usually about 3 cm. long, the axis and stiffly widely spreading branches flexuous; spikelets 1.1 mm. long, long pedicellate. Autumnal phase freely branching, forming dense cushions, the blades becoming involute. Open sandy land, southeastern United States, Cuba and British Honduras.

BRITISH HONDURAS. Belize District: Belize, *Bartlett* 11236. Gracie Rock Pine Ridge, *Gentle* 1556.

30. *Panicum lancearium* Trin. Gram. Pan. 223. 1826.

Perennial; culms densely tufted, erect, purplish, minutely puberulent; blades mostly 4 to 6 cm. long, 4 to 5 mm. wide, the white cartilaginous margins scabrous; panicles 3 to 6 cm. long; spikelets asymmetrically pyriform, pubescent or glabrous; first glume obtuse, clasping, smooth and shining. Autumnal phase freely branching from the upper nodes, the branches, panicles and blades crowded, much reduced. Sandy pine woods, southeastern United States, British Honduras, Cuba, and Dominican Republic.

BRITISH HONDURAS. Belize District: Belize, *Bartlett* 11225. Sibun River, *Peck* 425.

31. *Panicum viscidellum* Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Perennial; culms rather stout, erect to decumbent spreading, densely pilose, with a glabrous often viscid ring below, the nodes bearded; sheaths pilose to nearly glabrous; blades subcordate, 4 to 7 cm. long, 5 to 15 mm. wide, acute, minutely pubescent or sometimes nearly glabrous, the white cartilaginous margins shortly papillose-ciliate; panicles mostly 8 to 10 cm. long, the branches ascending, implicate, usually densely flowered, especially toward the base; spikelets 2 mm. long, pointed, pubescent. Pine woods, rocky or gravelly banks and open ground, Mexico and Cuba to Colombia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11759, 11831.

32. *Panicum rudgei* Roem. & Schult. Syst. Veg. 2: 444. 1817.

Perennial; culms stout, erect, more or less zigzag, 30 cm. to more than 1 m. tall, papillose-hispid; sheaths overlapping or a little shorter than the internodes, densely papillose-hispid with spreading hairs; blades 15 to 35 cm. long, 5 to 8 mm. wide, acuminate, hirsute on both surfaces; panicles terminal and axillary from the upper sheaths, dense, implicate; spikelets 3 to 3.5 mm. long, more or less hispid. Savannas and open ground, British Honduras and Jamaica to Brazil.

BRITISH HONDURAS. Toledo District: Monkey River, *Peck* 588.

33. *Panicum tuerckheimii* Hack. Allg. Bot. Zeitschr. 12: 60. 1906.

Perennial; culms erect, as much as 1 m. tall, the nodes appressed hispid; sheaths as long as or longer than the internodes; blades 10 to 30 cm. long, 1.5 to 2.5 cm. wide, narrowed toward the base, the margins sparsely ciliate at the base; panicles 15 to 30 cm. long, the branches rather distant, ascending, the lower ones as much as 15 cm. long; spikelets 3 mm. long, acuminate, glabrous or sparsely pilose, usually in pairs, the first subsessile, the second with a pedicel 2 to 3 mm. long. River banks, British Honduras and Guatemala.

BRITISH HONDURAS. Toledo District: Columbia Village, Rio Grande, *Smart* 41.

34. *Panicum hirtum* Lam. Encycl. 4: 741. 1798.

Annual; culms appressed-pilose, becoming decumbent spreading, rooting at the nodes, the branches erect or ascending, 15 to 30 cm. long; sheaths much shorter than the internodes, pilose; blades thin, cordate, 2 to 6 cm. long, 8 to 15 mm. wide, sparsely pilose, the margins scabrous, papillose-ciliate toward the base; panicles 5 to 7 cm. long, pyramidal, the branches spreading; spikelets 1.2 to 1.4 mm. long, obliquely placed on the pedicels, papillose-hirsute, the hairs spreading. Moist shady places, British Honduras; Trinidad to Ecuador and Brazil.

BRITISH HONDURAS. Belize District: Maskall, *Gentle* 979. El Cayo District: Duck Run, *Bartlett* 11533.

34. *ICHNANTHUS* Beauv.

Appendages of the lemma well developed.

Culms coarse, trailing, more than 3 m. long; blades attenuate pointed, 15 to 35 cm. long.....1. *I. mexicanus*

Culms relatively slender, less than 1 m. long; blades acute, 5 to 15 cm. long2. *I. standleyi*

Appendages of the lemma reduced to scars.

Culms caespitose, erect; blades often petiolate 3. *I. lanceolatus*

Culms widely spreading; blades more or less clasping at the base.

Peduncles not long exserted; blades 5 to 10 cm. long 4. *I. pallens*

Peduncles slender, long exserted; blades 1 to 5 cm. long 5. *I. tenuis*

1. *Ichnanthus mexicanus* Fourn. Mex. Pl. 2: 34. 1886.

Perennial; culms rather coarse, trailing, more than 3 m. long, glabrous; sheaths overlapping or a little shorter than the internodes, densely ciliate on the margins, densely villous especially toward the summit, sometimes villous only on the collar; blades flat, more or less cordate at the base, attenuate pointed, 15 to 35 cm. long, 18 to 30 mm. wide (the uppermost reduced), appressed hispid on the upper surface, pubescent or glabrous on the lower; panicles 12 to 30 cm. long, densely flowered, the branches in small fascicles, stiffly ascending, becoming more or less spreading at maturity, spikelet-bearing from the base, as much as 10 cm. long; spikelets 4 to 4.5 mm. long, short-pedicellate, appressed, solitary or in small clusters; first glume acute, half to two thirds as long as the spikelets, villous on the margins and at the apex or sometimes only scabrous; second glume and sterile lemma equal, scabrous; fruit 3 mm. long, chestnut brown at maturity, the appendages ovate-oblong, 0.5 mm. long. Moist ground along creeks, Mexico (Oaxaca) and British Honduras.

BRITISH HONDURAS. Without locality, *Kinloch* 72.

2. *Ichnanthus standleyi* Hitchc. Contr. U. S. Nat. Herb. 24: 662. 1930.

Perennial; culms erect or decumbent spreading, freely branching, rooting at the nodes, the ascending fertile branches 60 to 75 cm. long, compressed, papillose, appressed-pilose, or nearly glabrous on the lower part; sheaths shorter than the internodes, glabrous or sparsely pilose, the margins densely short-ciliate; ligule densely ciliate, 0.5 mm. long; blades ovate-lanceolate to broadly lanceolate, 5 to 15 cm. long, 1.5 to 3 cm. wide (rarely smaller), pilose, scabrous, or nearly glabrous, with thick white scabrous margins, the petiolate base 2 to 4 mm. long; panicles 5 to 15 cm. long, with 3 to 5 stiffly ascending or spreading racemes, the lowermost 4 to 5 cm. long, the uppermost less than 1 cm. long, the main axis terminating with a single spikelet; rachis of racemes rather thick, triangular, scabrous or pubescent; spikelets 6 to 7 mm. long, more or less crowded; first glume equaling or exceeding the spikelet, acuminate, 3-nerved, the keel scabrous to papillose-hispid, the margins papillose-ciliate with weak or coarse spreading hairs; second glume and sterile lemma equal, 5-nerved, the glume sparsely papillose-pilose to papillose-hispid on the keel and margins, the sterile lemma subglabrous; fruit 3 mm. long, white, with appendages 0.5 mm. long.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11628, 11685.

3. *Ichnanthus lanceolatus* Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 36. 1897.

Perennial; culms erect or decumbent at the base, 30 to 90 cm. tall; blades ovate to lanceolate, as much as 11 cm. long and 3 cm. wide, frequently petiolate; panicle 5 to 15 cm. long, the branches stiffly ascending; spikelets 4 to 4.3 mm. long; first glume acute, clasping, half as long as the spikelet; second glume and sterile lemma strongly nerved, exceeding the fruit. Forests and open brushy places, Yucatan Peninsula.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4833; *Gentle* 87. Orange Walk District: Honey Camp, *Lundell* 566. Belize District: Prospecto, *Gentle* 938. El Cayo District: El Cayo, *Bartlett* 11498.

4. *Ichnanthus pallens* (Swartz) Munro; Benth. Fl. Hongk. 414. 1861.

Perennial or appearing annual; culms slender, freely branching, widely spreading, rooting at the nodes; blades lanceolate, 5 to 10 cm. long, 1 to 2 cm. wide, somewhat unsymmetrical, rounded at the base, glabrous or nearly so; panicles numerous, terminal and axillary, 5 to 10 cm. long, the branches narrowly ascending; spikelets 3 to 3.5 mm. long, appressed, glabrous, the glumes and sterile lemma acuminate; appendages of the fertile lemma reduced to scars. Forests, thickets, and shady banks, southern Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 172, 312. Sibun River, *Smart* 73. Gracie Rock, *Gentle* 1584. Stann Creek District: All Pines, *Schipp* 784. Toledo District: Rio Grande, *Smart* 50. Temash River, *Smart* 56; *Schipp* 1375.

GUATEMALA. Petén: Uxactun, *Bartlett* 12330. Monte Santa Teresa, *Lundell* 2754.

5. *Ichnanthus tenuis* (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 334. 1917.

Annual; culms freely branching, very slender, weak, widely spreading, rooting at the nodes, the ascending fertile shoots 10 to 20 cm. long; blades 1 to 5 cm. long, 4 to 10 mm. wide, lanceolate, thin, more or less undulate, pubescent; panicles terminal and axillary the peduncles very slender, usually long-exserted, the branches rather stiff, widely to narrowly ascending; spikelets 3 mm. long, acuminate, sparsely pilose, at least on the margins; first glume attenuate-pointed. Moist shady places, British Honduras and Trinidad to Colombia.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11625, 11626. Belize District: Gracie Rock, *Gentle* 1599. Stann Creek District: Sittee River, *Schipp* 775.

35. *LASIACIS* (Griseb.) Hitchc.

Culms simple or sparingly branched, erect; blades cordate.....1. *L. procerrima*

Culms much branched, prostrate or clambering; blades not cordate.

Ligule prominent, 2 to 3 mm. long.....2. *L. oaxacensis*

Ligule inconspicuous, less than 1 mm. long.

Culms prostrate, rooting at the lower nodes.....3. *L. grisebachii*

Culms clambering, the base erect, not rooting at the lower nodes.

Blades glabrous on both surfaces.

Blades mostly less than 1 cm. wide; panicles 5 to 8 cm. long.....4. *L. divaricata*

Blades 2.5 to 4 cm. wide; panicles 15 to 25 cm. long.....5. *L. sloanei*

Blades pubescent on both surfaces or the upper nearly glabrous.

Culms densely papillose-pilose.....6. *L. papillosa*

Culms glabrous or nearly so.

Blades asymmetrical, ovate-lanceolate; panicles compactly flowered, the branches appressed.....7. *L. ruscifolia*

Blades symmetrical, lanceolate; panicles loosely flowered, the branches stiffly spreading.....8. *L. sorghoidea*

1. *Lasiacis procerrima* (Hack.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.
Water bamboo.

Culms erect, simple or sparingly branched, 1.5 to 2 m. tall; sheaths shorter than the internodes, the margins ciliate; blades mostly 15 to 30 cm. long, 2 to 4 cm. wide, acuminate, cordate at the base, pubescent; panicles open, 30 to 60 cm. long, the widely spreading branches as much as 40 cm. long, bearing toward the ends a few short-pedicellate spikelets 3 to 4 mm. long. Jungle borders, ravines and dry open ground, Mexico to Venezuela.

In British Honduras this grass is used by the Caribs for making brooms.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 107. Gracie Rock, *Gentle* 1743. El Cayo District: Mountain Pine Ridge, *Bartlett* 11623. Stann Creek District: All Pines, *Schipp* 785. Carib Reserve, *Smart* 39.

2. *Lasiacis oaxacensis* (Steud.) Hitchc. Proc. Biol. Soc. Washington 24: 45. 1911.

Plants without strong central canes, the culms slender, branching, creeping or clambering over low brush, as much as 5 m. long; blades narrowly lanceolate, 10 to 20 cm. long, 1 to 1.5 cm. wide, scabrous on both surfaces; panicles open, loosely flowered, 10 to 25 cm. long, the branches stiffly ascending, usually naked below; spikelets 4 mm. long. Thickets, southern Mexico to Ecuador; also in Jamaica and Hispaniola.

BRITISH HONDURAS. El Cayo District: Little Cocquericot, *Lundell* 3877. Toledo District: Columbia Village, *Smart* 47. Monkey River, *Peck* 593. Temash River, *Schipp* 1368.

3. *Lasiacis grisebachii* (Nash) Hitchc. Bot. Gaz. 51: 302. 1911.

Culms simple or much branched, prostrate, rooting at the lower nodes, the branches ascending; blades narrowly lanceolate 6 to 12 cm. long, 5 to 10 mm. wide, glabrous or with a few scattered hairs; panicles 4 to 8 cm. long, the branches few-flowered, stiffly ascending; spikelets 4 mm. long. Rich woods and thickets, eastern Mexico, British Honduras, Honduras, Guatemala and Cuba.

BRITISH HONDURAS. Orange Walk District: Honey Camp, *Lundell* 10, 559, 559a. Belize District: Prospecto, *Gentle* 866. Manatee Lagoon, *Peck* 197. El Cayo District: Between El Cayo and Benque Viejo, *Bartlett* 11505. Roaring Creek *Lundell* 437.

GUATEMALA. Petén: Uxactun, *Bartlett* 12190.

4. *Lasiacis divaricata* (L.) Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910. *Carrizo*, *Tzenetcho*.

Culms clambering, as much as 4 m. long, smooth, freely branching, the branches often zigzag; blades lanceolate, 5 to 12 cm. long, 5 to 15 mm. wide, glabrous; panicles pyramidal, mostly 5 to 8 cm. long (rarely as much as 12 cm.) the few-flowered branches 1 to 3 cm. long, spreading or reflexed; spikelets 4 mm. long. Thickets and edges of woods, southern Florida, Mexico and the West Indies, south to Argentina.

BRITISH HONDURAS. Corozal District: Corozal, *Gentle* 103. Port Sal, *Lundell* 4904, 4905 (in part). Orange Walk District?: Hillbank Camp, *Pelly* 35. Belize District: Manatee Lagoon, *Peck* 93. El Cayo District: Roaring Creek, *Lundell* 437. Stann Creek District: Middlesex, *Schipp* 332.

GUATEMALA. Petén: La Libertad, *Lundell* 2249, 3548, 4882; Aguilar 19. El Paso, *Lundell* 1587. Monte Santa Teresa, *Lundell* 2734.

5. *Lasiacis sloanei* (Griseb.) Hitchc. Bot. Gaz. 51: 302. 1911.

Culms widely spreading or clambering with long flowering branches; blades 8 to 15 cm. long, 1.5 to 3.5 mm. wide, ovate-lanceolate, bright green, often very glossy; panicles pyramidal, 15 to 25 cm. long, the branches few, stiffly ascending or spreading, the lower ones often 10 to 12 cm. long; spikelets 4 to 5 mm. long, secund, short-pedicellate, the pedicels appressed. Dense brush and low woods, Mexico and the West Indies to Colombia.

BRITISH HONDURAS. Orange Walk District: Honey Camp, *Lundell* 555.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12129.

6. *Lasiacis papillosa* Swallen, Carnegie Inst. Wash. Pub. No. 436: 349. 1934.

Culms erect or clambering over brush, 1 to 2 m. long, densely papillose-pilose with appressed hairs; blades ovate-lanceolate, 2 to 7 cm. long, mostly 10 to 15 mm. wide, conspicuously distichous, those of the young shoots lanceolate, often much reduced; flowering branches strongly zigzag with short internodes; panicles 5 to 12 cm. long, the few distant branches stiffly spreading or reflexed, the lower 3 to 5 cm. long; spikelets 4.5 mm. long. Brushy borders, southeastern Mexico and British Honduras.

BRITISH HONDURAS. Corozal District: Corozal, *Gentle* 560. Orange Walk District: Honey Camp, *Lundell* 91, 550. Belize District: Maskall, *Gentle* 1218.

7. *Lasiacis ruscifolia* (H.B.K.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Culms stout, usually freely branching; blades firm, asymmetrical, ovate-lanceolate, mostly 5 to 10 cm. long, 1.5 to 4 cm. wide, clasping at the base, softly pubescent, especially on the lower surface; panicles compactly flowered, 4 to 10 cm. long (rarely longer); spikelets short-pedicellate, 3.5 to 4 mm. long. Brushy woods, Mexico and the West Indies to Paraguay.

BRITISH HONDURAS. Corozal District: Port Sal, *Lundell* 4906; *Gentle* 104, 130. El Cayo District: El Cayo, *Bartlett* 11522.

GUATEMALA. Petén: Lake Petén, *Lundell* 3861. Yaxha-Remate road, *Lundell* 3862.

8. *Lasiacis sorghoidea* (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 16. 1917.

Culms coarse, erect or clambering, usually freely branching, glabrous or rarely somewhat pubescent; blades lanceolate, mostly 10 to 15 cm. long, 1.5 to 3 cm. wide (smaller on the branchlets), softly pubescent below, pubescent and more or less scabrous above, or rarely nearly glabrous; primary panicles 15 to 30 cm. long, the branches single or in twos, stiffly ascending or spreading; spikelets 4 mm. long, rather short pedicellate, usually appressed to the branches. Brushy borders, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. El Cayo District: El Cayo, *Bartlett* 11960, 12954.

36. *SACCIOLEPIS* Nash1. *Sacciolepis myuros* (Lam.) Chase, Proc. Biol. Soc. Washington 21: 7. 1908.

Annual; culms erect, mostly 0.5 to more than 1 m. tall; blades flat, elongate, usually not more than 3 mm. wide; panicles dense, spikelike, 10 to 20 cm. long, 5 mm. thick; spikelets 2 mm. long, short-pedicellate, obscurely pointed, the second glume and sterile lemma equal, strongly nerved, sparsely pilose

at the tip; first glume rounded, about 1 mm. long. Marshes and wet savannas, Mexico, Cuba, and Trinidad to Brazil and Bolivia.

BRITISH HONDURAS. Belize District: Belize, *Bartlett* 11253. Maskall Pine Ridge, *Gentle* 1043. Toledo District: Yecacos Lagoon, *Peck* 901.

37. HYMENACHNE Beauv.

1. *Hymenachne amplexicaulis* (Rudge) Nees, Agrost. Bras. 276. 1829.

Perennial; culms coarse, succulent, sparingly branched, often geniculate and rooting at the lower nodes; blades flat, cordate, 10 to 30 cm. long, 1 to 2.5 cm. wide, the margins scabrous; panicle dense and spikelike, 15 to 30 cm. long, 1 to 2 cm. thick, interrupted below; spikelets acuminate, 3 to 4 mm. long, the first glume 1.5 mm. long, acute, the second glume and sterile lemma more or less pilose toward the tip. Margins of rivers and swamps, tropics of both hemispheres.

BRITISH HONDURAS. Belize District: Little Cocquericot, *Lundell* 3869. El Cayo District: El Cayo, *Bartlett* 11456. Stann Creek District: Middlesex, *Schipp* 890.

38. HOMOLEPIS Chase

1. *Homolepis aturensis* (H.B.K.) Chase, Proc. Biol. Soc. Washington 24: 146. 1911.

Perennial; culms widely straggling, rooting at the lower nodes, glabrous; sheaths keeled, usually overlapping, the margins ciliate; blades flat, acuminate, cordate, 8 to 15 cm. long, 8 to 15 mm. wide, glabrous or sparsely pilose, the margins often ciliate at the base; panicles 5 to 10 cm. long, the few-flowered branches narrowly ascending or appressed; spikelets 6 to 7 mm. long, acuminate, glabrous, the first and second glume equal, covering the sterile and fertile lemmas. Woods, thickets and moist open ground, Mexico to Brazil and Bolivia.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 45. Gracie Rock, *Gentle* 1588, 1629. El Cayo District: Little Cocquericot, *Lundell* 3878. Stann Creek District: Middlesex, *Smart* 30. Stann Creek, *Schipp* 896. Toledo District: Temash River, *Smart* 54; *Schipp* 1373.

39. ISACHNE R. Br.

1. *Isachne polygonoides* (Lam.) Doell in Mart. Fl. Bras. 2^o: 273. 1877.

Annual; culms long creeping, branching, rooting at the nodes, the flowering shoots 20 to 30 cm. tall; sheaths 1 to 1.4 cm. long, much shorter than the internodes, spreading-hispid; blades cordate, spreading, 3 to 5 cm. long, 1 to 1.5 cm. wide, very scabrous; panicles about 5 cm. long, included at the base; spikelets about 1.8 mm. long, glabrous; lower floret staminate, glabrous, resembling the glume in texture; upper floret, fertile, indurate, white, pubescent. Swamps and wet savannas, British Honduras and the West Indies to Brazil.

BRITISH HONDURAS. Stann Creek District: All Pines, *Schipp* 777.

40. OPLISMENUS Beauv.

Plants annual; spikelets densely appressed-pilose 1. *O. burmanni*
Plants perennial; spikelets glabrous, or only sparsely short-pilose 2. *O. hirtellus*

1. *Oplismenus burmanni* (Retz.) Beauv. Ess. Agrost. 54. 1812.

Annual; culms slender, creeping, rooting at the nodes, mostly 30 to 50 cm. long; sheaths much shorter than the internodes, spreading-pilose; blades

thin, rounded at the base, pilose on both surfaces, mostly 2 to 6 cm. long, 8 to 14 mm. wide; racemes 3 to 5, approximate, ascending, the rachis densely hispid-ciliate; spikelets 3 to 4 mm. long, appressed-pilose; awns slender, 1 to 1.5 cm. long, antrorsely scabrous. Open or shady places, Mexico and the Dominican Republic to Brazil. Introduced from the Old World.

BRITISH HONDURAS. Stann Creek District: All Pines, *Schipp* 783.

2. *Oplismenus hirtellus* (L.) Beauv. Ess. Agrost. 54, 168. 1812.

Perennial; culms widely creeping, branching, rooting at the nodes, the ascending fertile shoots usually 30 to 50 cm. long; blades lanceolate or ovate-lanceolate, 3 to 10 cm. long, 1 to 2 cm. wide, glabrous; panicles 5 to 10 cm. long, with few to several ascending or spreading racemes, 1 to 2 cm. long; spikelets about 3 mm. long, the awns smooth, the awn of the first glume 5 to 10 mm. long. Woods and shady banks, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Maskall Pine Ridge, *Gentle* 1059. Gracie Rock, *Gentle* 1573. Manatee Lagoon, *Peck* 349. El Cayo District: El Cayo, *Bartlett* 11460. Roaring Creek, *Lundell* 381.

GUATEMALA. Petén: Uaxactun, *Bartlett* 12281. La Libertad, *Lundell* 2357. El Paso, *Lundell* 1594. Monte Santa Teresa, *Lundell* 2706.

41. *ECHINOCHLOA* Beauv.

1. *Echinochloa polystachya* (H.B.K.) Hitchc. Contr. U. S. Nat. Herb. 22: 135. 1920.

Perennial; culms coarse, decumbent at the base and rooting at the lower nodes; nodes appressed-hispid; ligule densely hairy, as much as 4 mm. long; blades flat, 30 to 40 cm. long, 1.5 to 2.5 cm. wide, the margins scabrous; panicles about 20 cm. long, dense, the rather short branches ascending; spikelets 5 mm. long, the sterile floret staminate, the awn 2 to 10 mm. long. Swamps and ditches near the coast, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. El Cayo District: Little Cocquericot, *Lundell* 3866.

42. *TRICHOLÆNA* Schrad.

1. *Tricholæna rosea* Nees, "Cat Sem. Hort. Vratisl. a. 1836;" Fl. Afr. Austr. 17. 1841. *Ilusion de Seda*; NATAL GRASS.

Perennial; culms slender, 0.5 to 1 m. tall, more or less decumbent at the base; sheaths sparsely papillose-hirsute; blades flat, 5 to 15 cm. long, 3 to 5 mm. wide; panicles rosy purple, 10 to 15 cm. long, the slender branches narrowly ascending to almost spreading; spikelets appearing somewhat clustered, 5 to 7 mm. long, including the hairs, on rather short, flexuous pedicels. Open ground, Florida and the West Indies to Colombia and Brazil. Introduced from Africa.

GUATEMALA. Petén: La Libertad, *Aguilar* 50.

43. *SETARIA* Beauv.

Bristles below each spikelet 5 or more..... 2. *S. geniculata*

Bristles below each spikelet rarely more than one.

Blades 2 to 3.5 cm. wide, narrowed toward both ends; plants perennial.

Panicles dense, spikelike; bristles below all the spikelets..... 5. *S. vulpisetia*

Panicles open, the branches long, spreading; bristles below only a part of the spikelets..... 1. *S. paniculifera*

Blades not more than 1 cm. wide, not narrowed toward the base;
plants annual.

- Bristles retrorsely scabrous, becoming implicate.....3. *S. tenacissima*
Bristles antrorsely scabrous, not implicate.....4. *S. yucatana*

1. *Setaria paniculifera* (Steud.) Fourn.; Hemsl. Biol. Centr. Amer. Bot. 3: 505. 1885.
Maicillo, Zacate Gamalote.

Perennial; culms robust, 1.5 to 4 m. tall; sheaths papillose-hispid, especially on the margins and collar; blades flat, plicate, narrowed toward both ends, scabrous, 0.5 to 1 m. long, mostly 3 to 5 cm. wide; panicles usually loose and open, 40 to 70 cm. long, the branches compound, as much as 25 cm. long; spikelets comparatively few, 3 mm. long, pointed, glabrous or obscurely pubescent, the subtending bristles about 15 mm. long. Wet forests, thickets, and swamps, Mexico and the West Indies to Colombia.

BRITISH HONDURAS. El Cayo District: El Cayo, *Bartlett* 11944, 11964, 12952. Toledo District: Moho River, *Peck* 565.

GUATEMALA. Petén: La Libertad, *Aguilar* 153.

2. *Setaria geniculata* (Lam.) Beauv. Ess. Agrost. 51: 178. 1812. *Cola de Gato*, Fox Tail.

Perennial; culms erect or spreading from short knotty rhizomes, 20 cm. to more than 1 m. tall; blades flat, mostly 5 to 15 cm. long, 4 to 6 mm. wide; panicles dense, spikelike, usually about 5 cm. long, yellow to reddish brown; bristles more than 5, 5 to 10 mm. long, scabrous; spikelets 2 to 2.5 mm. long, the fruit conspicuously transversely rugose. Open ground, cultivated and waste places, United States and the West Indies to Argentina. Also in the Old World.

BRITISH HONDURAS. Corozal District: San Andres, *Lundell* 4808. Orange Walk District: Honey Camp, *Lundell* 643. Belize District: Manatee Pine Ridge, *Gentle* 95. Gracie Rock, *Gentle* 1605. Stann Creek District: Middlesex, *Smart* 28. Toledo District: Toledo, *Peck* 491.

GUATEMALA. Petén: La Libertad, *Aguilar* 70.

3. *Setaria tenacissima* Schrad.; Schult. Mant. 2: 279. 1824.

Annual; culms erect or clambering, 1 to 2 m. tall; blades flat, scabrous and pubescent, 10 to 15 cm. long, 4 to 6 mm. wide (rarely as much as 1 cm.); panicles 5 to 10 cm. long, somewhat flexuous, the axis pubescent and sparsely villous; bristles becoming implicate, retrorsely scabrous above, antrorsely scabrous below, 5 to 10 mm. long; spikelets 1.5 mm. long, purple, the fertile lemma finely rugose. Brushy hillsides, Central America and the West Indies to Brazil.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11585.

4. *Setaria yucatana* Herrm. Beitr. Biol. Pflanz. 10: 51. 1910.

Annual; culms erect or ascending, sometimes rooting at the lower nodes, branching, 1 to 1.5 m. tall; sheaths papillose-pilose or only papillose, the margins ciliate; blades softly pubescent, the margins scabrous, 10 to 25 cm. long, 5 to 10 mm. wide; panicles oblong, tapering above, 10 to 30 cm. long, the branches spreading, densely flowered to the base, the lowermost 1 to 3 cm. long; spikelets 1.8 mm. long, the fertile lemma minutely rugose. Open ground, roadsides and cultivated fields. Known only on the Yucatan Peninsula.

BRITISH HONDURAS. Corozal District: San Andres, *Lundell* 4853. Santa Rita, *Lundell* 4939.

5. *Setaria vulpiseta* (Lam.) Roem. & Schult. Syst. Veg. 2: 495. 1817.

Perennial; culms coarse, tufted, as much as 2 m. tall; blades often 50 cm. long, 2 to 3.5 cm. wide, narrowed to both ends, the margins scabrous; panicles 15 to 30 cm. long, the axis densely villous; spikelets 2.5 mm. long, the fertile lemma coarsely rugose. Open or brushy places, southern Mexico and the West Indies to Peru and Argentina.

BRITISH HONDURAS. Corozal District: Without locality, *Gentle* 507. El Cayo District: El Cayo, *Bartlett* 12953. Stann Creek District: Stann Creek, *Schipp* 373.

44. PENNISETUM L.

1. *Pennisetum nervosum* (Nees) Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 177. 1834.

Perennial; culms usually in clumps, decumbent at the base, 2 to 3 m. tall; blades elongate, scabrous, 8 to 15 mm. wide; panicles dense, flexuous at maturity, 12 to 20 cm. long, 12 to 15 mm. thick; spikelets solitary, sessile, 6 to 7 mm. long; bristles slender, scabrous, unequal, 12 to 15 mm. long. Open or brushy ground, British Honduras; Ecuador and Brazil to Argentina.

BRITISH HONDURAS. El Cayo District: Little Cocquericot, *Lundell* 3867.

45. CENCHRUS L.

Burs not more than 4 mm. wide, densely crowded in a long spike; first

glume obsolete 1. *C. brownii*

Burs 5 to 7 mm. wide, not crowded; first glume present 2. *C. echinatus*

1. *Cenchrus brownii* Roem. & Schult. Syst. Veg. 2: 258. 1817. Based on *C. inflexus* R. Br., not Poir. 1804.

Cenchrus viridis Spreng. Syst. Veg. 1: 301. 1825.

Annual; culms decumbent at the base and rooting at the lower nodes, 0.5 to 1 m. tall; sheaths compressed keeled; blades flat, thin, 10 to 30 cm. long, mostly 6 to 8 mm. wide; spikes 4 to 10 cm. long, dense; burs subglobose, 4 mm. wide, pubescent, the lobes interlocking, usually bearing 3 spikelets. Open ground and waste places, Florida, Mexico, and the West Indies to Bolivia and Brazil.

GUATEMALA. Petén: El Paso, *Lundell* 1541.

2. *Cenchrus echinatus* L. Sp. Pl. 1050. 1753. BUR-BUR.

Annual; culms decumbent spreading, usually 30 to 50 cm., sometimes as much as 1 m. long, compressed, glabrous; blades flat, more or less pilose; spikes 3 to 10 cm. long; burs scarcely crowded, pubescent, the lobes comparatively slender, not interlocking; spikelets 2 to 4 in each bur. Open ground and waste places, southern United States and the West Indies to Argentina.

BRITISH HONDURAS. Corozal District: Corozal, *Lundell* 4733. San Andres, *Gentle* 5. Without locality, *Gentle* 280. Belize District: Belize, *Gentle* 52. Stann Creek District: Middlesex, *Schipp* 893.

46. OLYRA L.

Fertile lemma silky villous at the base and on the margins 1. *O. yucatanana*

Fertile lemma glabrous 2. *O. latifolia*

1. *Olyra yucatanana* Chase, Proc. Biol. Soc. Washington 21: 178. 1908. *Carrizo*.

Perennial; culms in small clumps, simple, erect, about 1 m. tall; blades unsymmetrical, 10 to 16 cm. long, 2 to 5 cm. wide; short-petiolate, the petioles hispid; panicles narrow, terminal and axillary, 5 to 10 cm. long; staminate spikelets 6 mm. long, purple; pistillate spikelets 15 to 25 mm. long; fruit 7 mm. long. Rich woods, Yucatan to British Honduras and Guatemala.

BRITISH HONDURAS. Corozal District: San Antonio, *Lundell* 4759. Orange Walk District: Tower Hill Estate, *Karling* 56. El Cayo District: El Cayo, *Bartlett* 11475. Roaring Creek, *Lundell* 331.

GUATEMALA. Petén: El Paso, *Lundell* 1574. La Libertad, *Lundell* 3375, 3497. Hiltun, *Lundell* 3586. Uaxactun, *Bartlett* 12167; Monte Santa Teresa, *Lundell* 2682, 2768.

2. *Olyra latifolia* L. Syst. Nat. ed. 10, 2: 1261. 1759. *Zit, Carrizo*.

Perennial; culms somewhat woody, usually erect, freely branching, as much as 5 m. long; blades asymmetrical, lanceolate-oblong, as much as 20 cm. long and 5 mm. wide; panicles ovoid, 10 to 15 cm. long, the branches stiffly ascending or spreading; fruit 5 to 6 mm. long, glabrous. Rich woods, Mexico and the West Indies to Bolivia and Brazil.

BRITISH HONDURAS. Orange Walk District: Tower Hill Estate, *Karling* 38. Belize District: Manatee Lagoon, *Peck* 109. Maskall, *Gentle* 1020. Gracie Rock, *Gentle* 1639. El Cayo District: Little Cocquericot, *Lundell* 3874. Roaring Creek, *Lundell* 331. El Cayo, *Bartlett* 11566. Duck Run, *Bartlett* 11538. Mountain Pine Ridge, *Bartlett* 11850. Stann Creek District: Stann Creek Valley, *Kinloch* 177, 179. Cockscomb Mountains, *Schipp* 531. Toledo District: Toledo, *Peck* 533. Without locality, *Peck* 609.

GUATEMALA. Petén: La Libertad, *Lundell* 3610; *Aguilar* 47.

47. LITHACHNE Beauv.

1. *Lithachne pauciflora* (Swartz) Beauv. in Poir. Dict. Sci. Nat. 27: 60. 1823.

Perennial; culms tufted, slender, woody, 30 to 50 cm. tall, more or less geniculate below at the enlarged grooved nodes; lower sheaths bladeless; blades flat, asymmetrical, acuminate, 5 to 8 cm. long, 1.5 to 2.5 cm. wide, the margins scabrous; panicles terminal and axillary, the terminal wholly staminate, the axillary composed of a single terminal pistillate spikelet, and 1 to several staminate spikelets below it; second glume and sterile lemma of the pistillate spikelet equal, attenuate, about 1 cm. long; fruit 4 to 5 mm. long, triangular, white and shining. Moist rich woods, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. El Cayo District: El Cayo, *Bartlett* 11492. Toledo District: Toledo, *Peck* 507.

GUATEMALA. Petén: La Libertad, *Lundell* 2328, 3863.

48. IMPERATA Cyrillo

1. *Imperata contracta* (H.B.K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893.

Perennial; culms erect from strong rhizomes, 1 to 1.5 m. tall; blades elongate, about 1 cm. wide, acuminate, narrowed toward the base to little more than the midrib, ciliate and pilose on the upper surface at the base, the margins scabrous; panicles silky, as much as 40 cm. long, the short branches

somewhat spreading. Meadows and open grassland, Mexico and the West Indies to Brazil and Chile.

GUATEMALA. Petén: Kantetul, *Lundell* 3167.

49. SACCHARUM L.

1. *Saccharum officinarum* L. Sp. Pl. 54. 1753. SUGARCANE.

Perennial; culms stout, tall, short-jointed, with broad blades and large feathery panicles. Cultivated throughout tropical regions.

50. ANDROPOGON L.

Racemes solitary on each peduncle.

Annual; culms widely spreading.....1. *A. brevifolius*

Perennial; culms caespitose, erect

Spikelets awned; racemes 2 to 8 cm. long.

Racemes few, straight, not conspicuously villous.....2. *A. semiberbis*

Racemes numerous, flexuous, villous, crowded in a dense

plumelike inflorescence.....3. *A. condensatus*

Spikelets awnless; racemes about 1 cm. long.....4. *A. virgatus*

Racemes 2 to 5 on each peduncle.

Racemes numerous, aggregate (except in *A. virginicus*) in a dense plumelike inflorescence.

Spikelets awned.

Racemes much shorter than the spathes; inflorescence open.....5. *A. virginicus*

Racemes usually exceeding the spathes; inflorescence dense.....6. *A. glomeratus*

Spikelets awnless.....7. *A. bicornis*

Racemes few, not aggregate.

Ligule 2 mm. long; tips of the blades acute.....8. *A. leucostachyus*

Ligule less than 1 mm. long; tips of the blades boat-shaped.....9. *A. selloanus*

1. *Andropogon brevifolius* Swartz, Prodr. Veg. Ind. Occ. 26. 1788.

Annual; culms slender, compressed, freely branching, widely creeping, 6 cm. to more than 1 m. long; blades flat, abruptly pointed, 1 to 5 cm. long, 1 to 4 mm. wide; racemes solitary, 1 to 2 cm. long; spikelets 3 mm. long, scabrous, the awns about 1 cm. long, geniculate, tightly twisted below the bend. Brushy slopes, banks and open ground, tropical regions of both hemispheres.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11826.

2. *Andropogon semiberbis* (Nees) Kunth, Rev. Gram. 1: Suppl. XXXIX. 1830.

Perennial; culms tufted, erect 0.5 to 1.5 m. tall; blades flat, acute, 10 to 20 cm. long, 2 to 5 mm. wide; racemes solitary, few, erect, 4 to 8 cm. long; rachis and sterile pedicel ciliate toward the summit; sessile spikelet 5 to 6 mm. long, the first glume glabrous; awn 1 cm. long, geniculate, twisted below. Dry or rocky hills and plains, Florida, eastern Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 282. El Cayo District: Mountain Pine Ridge, *Bartlett* 11695.

3. *Andropogon condensatus* H.B.K. Nov. Gen. & Sp. 1: 188. 1816.

Perennial; culms densely tufted, erect, 1 to 1.5 m. tall; blades rather firm, 15 to 25 cm. long, 3 to 10 mm. (usually about 5 mm.) wide; inflorescence 15 to 40 cm. long, the branches aggregate, appressed to somewhat spreading;

racemes becoming conspicuously flexuous or tortuous, 2 to 3 cm. long, usually partly enclosed in the short, narrow spathes; spikelets about 3.5 mm. long, the awns delicate, geniculate, 1 cm. long. Open ground, Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 59. El Cayo District: Duck Run, *Bartlett* 11528.

GUATEMALA. Petén: Kantetul, *Lundell* 3169. La Libertad, *Lundell* 2374.

4. *Andropogon virgatus* Desv.; Hamilt. Prodr. Pl. Ind. Occ. 9. 1825.

Perennial; culms tufted, relatively slender, 1 to 2 m. tall; sheaths much shorter than the internodes; blades flat or loosely rolled, rather firm, 10 to 20 cm. long, 2 to 4 mm. wide, more or less villous on the upper surface at the base; inflorescence narrow, dense, not silky, the branchlets numerous, crowded; racemes solitary, few-flowered, partly enclosed in the short, comparatively broad spathes, 1 cm. long; spikelets 3 to 4 mm. long, awnless. Open wet prairies, British Honduras and the West Indies to Brazil.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 54. Belize, *Bartlett* 11237. El Cayo District: Mountain Pine Ridge, *Bartlett* 11611, 11781.

5. *Andropogon virginicus* L. Sp. Pl. 1046. 1753.

Perennial; culms densely tufted, 1 to 1.5 m. tall; lower leaves crowded in a conspicuous basal cluster, the sheaths flattened, keeled, the blades elongate, 2 to 4 mm. wide; upper sheaths much shorter than the internodes; inflorescence nearly half the length of the culm; racemes usually paired, slender, flexuous, more or less included in the broad, rather conspicuous spathes; rachis and pedicels villous; sessile spikelet 3 to 4 mm. long, the awn straight, delicate, 1 to 1.5 cm. long. Open ground, southern United States to Panama and the West Indies.

BRITISH HONDURAS. Belize District: Manatee Lagoon, *Peck* 150.

6. *Andropogon glomeratus* (Walt.) B.S.P. Prel. Cat. N. Y. 67. 1888.

Perennial; culms in dense clumps, erect, 0.5 to 1.5 m. tall; lower sheaths broad, keeled, much overlapping, usually pilose at least on the margins; blades firm, flat or folded, linear, 3 to 5 mm. wide; inflorescence dense, plume-like; racemes in pairs, slender, flexuous, 1.5 to 3 cm. long, villous; spikelets 3 to 4 mm. long, the awns delicate, straight, about 15 mm. long. Open often wet ground, southern United States and the West Indies to northern South America.

BRITISH HONDURAS. Corozal District: Corozal, *Gentle* 107, 134. Corozal-Orange Walk road, *Lundell* 4902. Orange Walk District: Honey Camp, *Lundell* 428. Tower Hill Estate, *Karling* 55.

GUATEMALA. Petén: La Libertad, *Lundell* 2482, 3482.

7. *Andropogon bicornis* L. Sp. Pl. 1046. 1753. *Zacaton*.

Perennial, usually coarse; culms tufted, erect, 1 to 2 m. tall; blades firm, elongate, 2 to 5 mm. wide, the margins serrate; inflorescence large, compound, the numerous branches crowded, forming a white or tawny plume; racemes paired, 2 to 3 cm. long, slender, flexuous, on long, slender peduncles, the spathes inconspicuous; spikelets about 2.5 mm. long, awnless. Open hillsides, swamps, and grassy places, southern Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Stann Creek District: Middlesex, *Smart* 25. All Pines, *Schipp* 654.

GUATEMALA. Petén: Lake Zotz, *Lundell* 3316. La Libertad, *Aguilar* 268.

8. *Andropogon leucostachyus* H.B.K. Nov. Gen. & Sp. 1: 187. 1816.

Perennial; culms slender, densely tufted, erect, 25 to 70 cm. tall; lower sheaths crowded, flattened, keeled; blades usually flat, 1 to 3 mm. wide (mostly 2 mm.), acute; racemes densely villous, usually paired, (sometimes 3), the pairs scattered, the slender peduncles long-exserted, the spathes small, inconspicuous; spikelets 3 mm. long, awnless, obscured by the long silky hairs. Open usually dry fields, hillsides, and pine ridges, southern Mexico and the West Indies to Argentina.

BRITISH HONDURAS. Belize District: Belize River, *Smart* 36. Manatee Lagoon, *Peck* 116.

GUATEMALA. Petén: La Libertad, *Lundell* 2396.

9. *Andropogon selloanus* (Hack.) Hack. Bull. Herb. Boiss. II. 4: 266. 1904.

Resembling *A. leucostachyus*; blades rather short, 3 to 5 mm. wide, the tips boat-shaped; ligule short; racemes 3 to 5, rather more densely villous, tawny. Dry wooded hills and open banks, British Honduras and the West Indies to Paraguay.

BRITISH HONDURAS. Belize District: Baker's Pine Ridge, *Lundell* 3788.

GUATEMALA. Petén: Sabana Zotz, *Lundell* 3596.

51. CYMBOPOGON Spreng.

1. *Cymbopogon citratus* (DC.) Stapf, Kew Bull. Misc. Inf. 1906: 322. 1906. *Te de Limon*, LEMON GRASS.

Perennial; culms in dense clumps with numerous leafy sterile shoots; blades elongate, 5 to 15 mm. wide, scabrous on the margins. Not known to flower in America. Introduced from the Old World, and commonly planted for its strong lemon scent.

GUATEMALA. Petén: La Libertad, *Aguilar* 42.

52. HYPARRHENIA Anderss.

1. *Hyparrhenia rufa* (Nees) Stapf in Prain, Fl. Trop. Afr. 9: 304. 1918.

Perennial; culms erect, usually in small clumps, 1 to 2.5 m. tall; blades flat, linear, mostly 2 to 5 mm. wide; racemes paired, 2 to 3 cm. long, numerous, the peduncles slender, flexuous, long-exserted; rachis joints and the pedicel of the sterile spikelet pilose on the margins with rufous hairs; spikelets 4 mm. long, the glumes more or less pilose; pedicellate spikelet awnless, the sessile with a twice geniculate awn about 15 mm. long. Moist open ground in tropical regions, Guatemala to Brazil and Venezuela. Introduced from Africa.

GUATEMALA. Petén: La Libertad, *Aguilar* 240.

53. SORGHUM Moench

1. *Sorghum vulgare* Pers. Syn. Pl. 1: 101. 1805. *Maicillo*; SORGHUM.

Annual; culms coarse, with broad, flat, smooth blades, and dense heavy panicles. Warm regions of both hemispheres. Sometimes cultivated for forage and the seeds for human food. Commonly used "para hacer dulces y atolillos." Warm regions of both hemispheres.

GUATEMALA. Petén: La Libertad, *Aguilar* 35, 90.

54. TRACHYPOGON Nees

Spikelets rather distant, the conspicuous white callus hairs contrasting with the usually dark purple glumes; awns short-hispid; ligule mostly 3 to 10 mm. long.....

1. *T. montufari*

Spikelets crowded, pale, the callus hairs inconspicuous; awns distinctly plumose; ligule not more than 1.5 mm. long.....

2. *T. angustifolius*

1. *Trachypogon montufari* (H.B.K.) Nees, Agrost. Bras. 342. 1829.

Perennial; culms tufted, erect, 30 cm. to more than 1 m. tall; nodes appressed-hispid; blades flat or subinvolute, attenuate-pointed, 8 to 30 cm. long, not more than 5 mm. wide (usually less); racemes solitary (rarely paired), 8 to 15 cm. long; spikelets about 1 cm. long; glumes pubescent, dark purple; awns 3 to 5 cm. long, twice geniculate, appressed-hispid, the hairs short. Dry rocky hills and waste places, Mexico to Ecuador.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11785.

2. *Trachypogon angustifolius* (H.B.K.) Nees; Hack. DC. Monog. Phan. VI: 326. 1889. *Pajon*.

Perennial; culms slender, erect, 40 to 80 cm. tall; sheaths glabrous or the lower ones sparsely pilose; blades 5 to 20 cm. long (usually about 10 cm.), 1 to 3 mm. wide; ligule not more than 1.5 mm. long; racemes solitary (or rarely paired), 8 to 12 cm. long; fertile spikelets 8 mm. long; glumes pale, pubescent below, glabrous or nearly so above; awns 3 to 4.5 cm. long, plumose to the second bend, sometimes throughout. Sandy prairies and rocky hills, Mexico to Colombia; also in Bolivia and Uruguay.

One of the dominant grasses of open well-drained grasslands of central Petén.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11746, 11747. Belize District: Manatee Lagoon, *Peck* 139. Gracie Rock, *Gentle* 1646.

GUATEMALA. Petén: La Libertad, *Lundell* 2306, 2392, 2467. Sabana Zotz, *Lundell* 3595.

55. ISCHÆMUM L.

1. *Ischæmum latifolium* (Spreng.) Kunth, Rév. Gram. 1: 168. 1829.

Annual; culms freely branching, decumbent, widely spreading, or suberect, rooting at the lower nodes, as much as 3 m. long; blades 10 to 20 cm. long, 1 to 3 cm. wide, acuminate, narrowed toward the base, the margins scabrous; racemes 4 to 8 cm. long, few to several, aggregate on the short axis. Brushy slopes, pine woods, and open banks, Mexico and the West Indies to Ecuador and Brazil.

BRITISH HONDURAS. Belize District: Sibun River, *Bartlett* 11398, *Gentle* 1442. Manatee Lagoon, *Peck* 254; *Smart* 61. El Cayo District: Mountain Pine Ridge, *Bartlett* 11843. Stann Creek District: New Town, *Schipp* 897.

56. HACKELOCHLOA Kuntze

1. *Hackelochloa granularis* (L.) Kuntze, Rev. Gen. Pl. 2: 776. 1891.

Annual; culms slender, freely branching; sheaths conspicuously hispid; blades flat, mostly 5 to 10 cm. long, 5 to 10 mm. wide; racemes solitary, numerous, short, single from each bract; rachis joint and sterile pedicel

grown together; spikelets awnless, the sessile one brown, globose with an alveolate first glume, the pedicellate staminate, green, the first glume lanceolate, scabrous. A common weed in open grassy places in tropical regions.

BRITISH HONDURAS. Toledo District: Toledo, *Peck* 653.

57. *TRIPSACUM* L.

Blades 1 to 2 cm. wide.....	1. <i>T. dactyloides</i>
Blades 3 to 6 cm. wide.....	2. <i>T. latifolium</i>

1. *Tripsacum dactyloides* (L.) L. Syst. Nat. ed. 10. 2: 1261. 1759.

Differing from *T. latifolium* chiefly in having narrower blades, 1 to 2 cm. wide. Open ground, eastern United States and the West Indies to Paraguay and Bolivia.

GUATEMALA. Petén: La Libertad, top of limestone hill, *Lundell* 2836 (specimen without inflorescence).

2. *Tripsacum latifolium* Hitchc. Bot. Gaz. 41: 294. 1906.

Perennial; culms coarse, 2 to 4 m. tall; blades flat, long-acuminate, narrowed below into a long petiole-like base, 70 cm. to more than 1 m. long, 2.5 to 6 cm. wide, the margins serrate; inflorescence monoecious, composed of one or more spikelike racemes, the pistillate spikelets below, embedded in the articulate rachis, the staminate ones above. Rocky slopes, Mexico and Central America.

BRITISH HONDURAS. El Cayo District: Mountain Pine Ridge, *Bartlett* 11888. Toledo District: Ycacos Lagoon, *Peck* 703.

58. *ZEA* L.

1. *Zea mays* L. Sp. Pl. 971. 1753. *Ixim*; MAIZ.

Annual; culms coarse, tall, with broad, flat, recurved blades; staminate inflorescence terminal, composed of numerous, drooping, one-sided, spikelike racemes; pistillate inflorescence axillary, the spikelets arranged in rows around a thickened, woody axis, the whole enclosed in numerous leaf-like bracts.

Commonly cultivated in warm and temperate regions.



Oryza alta Swallen. Basal part of type specimen, Swallen 5116, collected at Obidos, Pará, Brazil.



Oryza alta Swallen. Upper part of type specimen, Swallen 5116, collected at Obidos, Pará, Brazil.



Ichnanthus mexicanus Fourn. Kinlock 72, collected in British Honduras. This species was described from fragmentary material collected in Oaxaca, Mexico (Liebmann 457). The habit was unknown, but this specimen shows that the plant is a long trailing grass.



Ichnanthus standleyi Hitchc. Bartlett 11685, collected on Mountain Pine Ridge, El Cayo District, British Honduras. This species was originally described from depauperate plants collected in Honduras by Paul C. Standley (No. 56207). This specimen shows the true character of the species.

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

X

THE ACANTHACEÆ OF THE YUCATAN PENINSULA

BY E. C. LEONARD

With nineteen text-figures

[Issued June 25, 1936]

THE ACANTHACEÆ OF THE YUCATAN PENINSULA ¹

In order to facilitate identification of future botanical specimens procured in the regions of the Yucatan Peninsula, I have made an attempt to bring together in this paper all species of the family Acanthaceæ known to the present time. Sixty-two species and varieties are here described, mainly from material collected by Deam, Gaumer, Gentle, Lundell, Millspaugh, Peck, Schipp, Schott, Steere, and Valdez, as represented by specimens in the Field Museum, the University of Michigan, the Gray Herbarium, and the United States National Herbarium. Of these, eight appear to be new to science.

ACANTHACEÆ J. St. Hil.

Acanthus Family

Herbs, shrubs, or small trees; leaves simple, estipulate; flowers irregular to nearly regular, perfect; calyx persistent, inferior, the segments 5 or occasionally fewer, imbricate; corolla gamopetalous, the limb 5-lobed or 2-lipped; stamens 4, didynamous, or 2 only; staminodes sometimes present; anther sacs 2 or 1, longitudinally dehiscent; ovary 2-celled, the ovules 2 to 10 in each cavity; style filiform, simple; stigmas 1 or 2; fruit a capsule (drupaceous in *Mendoncia*), 2-celled, 2-valved; seeds usually flat and rounded, borne on retinacula (papilliform or more often hook-shaped projections from the placentæ), the testa smooth or roughened, often developing threads and mucilage when moistened.

Fertile stamens 4.

Plants usually scandent; seeds on papilliform retinacula.

Fruit drupaceous 1. MENDONCIA

Fruit capsular, 2- to 4-seeded..... 2. THUNBERGIA

Plants not scandent, usually erect herbs or shrubs; seeds on hook-like retinacula.

Calyx 3-parted 3. LOUTERIDIUM

Calyx 4- or 5-parted.

Anthers 2-celled.

Calyx segments very dissimilar, the posterior and anterior ones much larger than the lateral, the anterior pair more or less united.

Corolla 2-lipped, 5 mm. long, white or violet..... 4. LEPIDAGATHIS

Corolla with 5 nearly equal lobes, 15 mm. long, yellow (bluish purple when dry)..... 5. BARLERIA

Calyx segments similar or nearly so.

Filaments free.

Shrubs or small trees; anther lobes strongly calcarate at base

6. BRAVAISIA

Herbs; anther lobes not spurred at base..... 7. BLECHUM

Filaments united in pairs at base.

Corolla 2-lipped. Flowers solitary or fascicled in the axils 8. HYGROPHILA

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- Corolla with 5 nearly equal lobes.
 Flowers in closely imbricate bracted spikes..... 7. BLECHUM
 Flowers axillary or in loose terminal or axillary
 cymes or panicles, the bracts inconspicuous
 and usually linear..... 9. RUELLIA
- Anthers 1-celled.
 Low acaulescent herbs; spikes lax..... 10. STENANDRIUM
 Shrubs or large herbs, leafy-stemmed; spikes dense, the
 bracts closely imbricate..... 11. APHELANDRA
- Fertile stamens 2.
 Calyx segments 3-parted..... 3. LOUTERIDIUM
 Calyx 4- or 5-parted.
 Peduncles bearing many lanceolate coriaceous bracts; seeds
 on papilliform retinacula..... 12. ELYTRARIA
 Peduncles, if present, without bracts; seeds on hook-like
 retinacula.
 Calyx segments strongly unequal..... 5. BARLERIA
 Calyx segments equal or nearly so.
 Inner bracts posteriorly connate to near tip, forming a
 capsule-like involucre, larger than the outer bracts..... 13. HENRYA
 Inner bracts narrow, not at all connate, usually shorter
 than the outer bracts.
 Outer bracts 4-ranked, large; flowers borne in very
 dense spikes..... 14. TETRAMERIUM
 Outer bracts not 4-ranked, usually small and narrow;
 flowers variously arranged.
 Stamines present.
 Stamens included; limb spreading, 5-lobed, the
 lobes subequal..... 15. PSEUDERANTHEMUM
 Stamens exserted; limb 2-lipped..... 16. ODONTONEMA
 Stamines none.
 Anther cells obtuse at base, sometimes mucronu-
 late, rarely calcarate.
 Calyx hyaline, membranous; placenta separating
 from the capsule walls..... 17. DICLIPTERA
 Calyx green, herbaceous; placenta remaining
 attached to the capsule walls at maturity..... 18. JACOBINIA
 Anther cells distinctly calcarate at base.
 Bracts imbricate; pollen marked by longitudinal
 ribs..... 19. DREJERELLA
 Bracts not imbricate or, if imbricate, the pollen
 marked by small knobs.
 Corolla usually short, the tube ampliate
 above..... 20. JUSTICIA
 Corolla elongate, not or scarcely ampliate..... 21. BELEPERONE

I. MENDONCIA Vell.

Twining, herbaceous or suffrutescent vines; leaf blades usually ovate, elliptic, or oblong, entire, petioled; flowers pediceled, one to several in the axils of the leaves, each flower subtended by a pair of conspicuous bracts; corolla usually red or white, 5-lobed; stamens 4, paired; anther lobes diverging, bearded; calyx usually a minute ring; fruit drupaceous, usually dry and compressed at tip.

- Bracts oblong-lanceolate, acuminate at apex, densely pilose..... 1. *M. lindavii*
 Bracts oblong, rounded and retuse at apex, glabrous..... 2. *M. retusa*

1. MENDONCIA LINDAVII Rusby, Mem. Torrey Club 4: 241. 1895.

Mendoncia belizensis Standl. Field Mus. Bot. 11: 142. 1932.

A large densely ferruginous-pilose vine; leaf blades ovate to broadly oval, 5 to 10 cm. long, 2 to 5.5 cm. wide, acuminate and sometimes mucronate at apex, narrowed or rounded at base; petioles up to 1.5 cm. long; flowers single or in pairs; pedicels 2 to 3 cm. long; bracts oblong-lanceolate, sub-falcate, 3 to 4 cm. long, 1 cm. wide, acuminate and usually mucronate at apex, partly connate; corolla red, pink, or white, tubular, glabrous, the lobes rounded, 4 to 5 mm. long, entire; fruit ovoid, compressed, keeled, about 2 cm. long and 1 cm. wide, brown-puberulent.—Wet forests of lower mountain slopes up to 900 meters; Guatemala to Bolivia.

BRITISH HONDURAS: Stann Creek Valley, *Schipp* 961 (type of *M. belizensis*).

2. MENDONCIA RETUSA Turrill, Kew Bull. Misc. Inf. 1919: 423. 1919.

Stem conspicuously quadrangular, narrowly winged, glabrous or sparingly pilose upward; leaf blades elliptic, 5 to 12 cm. long, 3 to 7 cm. wide, abruptly acuminate and mucronulate at apex, rounded or narrowed at base, entire, glabrous, or the costa and lateral veins sparingly pilose; flowers solitary, the pedicels 2 to 3 cm. long; bracts oblong, 1 to 2.5 cm. long, 1.5 cm. wide, rounded at both ends, retuse and apiculate at apex, glabrous; corolla white with purple throat, glabrous, 4 to 5 cm. long, the lobes broadly obovate, spreading, 5 to 10 mm. long; fruit black, minutely puberulent or glabrescent, ovoid, about 1.5 cm. long.—Moist forests; throughout Central America.

BRITISH HONDURAS: Toledo, *Schipp* 1051.

2. THUNBERGIA Retz.

Mostly herbaceous vines with opposite hastate or cordate leaves and large 2-bracted flowers, solitary in the axils of the leaves, or in terminal racemes; calyx short, annular; corolla tube oblique, the limb 5-lobed; stamens 4, didynamous; ovary with 2 ovules in each cavity; capsule coriaceous, globose, abruptly beaked.

Petioles winged; corolla usually yellow with a dark purple eye..... 1. *T. alata*

Petioles not winged; corolla blue or white.

Corolla blue, 7 cm. long or more..... 2. *T. grandiflora*

Corolla pure white, up to 3 cm. long..... 3. *T. fragrans*

1. THUNBERGIA ALATA Bojer; Sims, Bot. Mag. 52: pl. 2591. 1825.

A trailing or climbing pubescent vine up to 1 meter long; leaf blades ovate to triangular-ovate, 2 to 8 cm. long, remotely few-toothed to entire, acute at apex, cordate or hastate at base; petioles winged; flowers axillary, the slender peduncles longer than the petioles; bracts ovate-lanceolate, about 1.5 cm. long, acute or acuminate; calyx shorter than the bracts; corolla 2.5 to 4 cm. long, yellow or white, usually with a purple eye, capsule depressed-globose, pubescent, 0.5 to 1 cm. in diameter, the stout beak about 1 cm. long.—Roadsides and waste places; tropical America generally. A native of eastern Africa.

BRITISH HONDURAS: El Cayo, *Chanek* 200.

GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1598.

2. *THUNBERGIA GRANDIFLORA* Roxb. Hort. Beng. 45. 1814; Fl. Ind. 3: 34. 1832.

A shrubby climbing pilose vine; leaf blades cordate, 6 to 10 cm. long or more, acuminate, coarsely dentate, the teeth relatively large; petioles slender, about as long as the leaf blades; flowers axillary or borne in elongate racemes, the peduncles 1 to 8 cm. long; spathe valves ovate, oblique, black-punctate, the upper margins straight and sometimes slightly coherent, the lower rounded and separate; corolla up to 7.5 cm. long, bright blue, glabrous, the lobes rounded; anthers spurred; capsule about 4 cm. long, woody.—Widely cultivated in tropical America as an ornamental; naturalized locally. Native of Bengal.

BRITISH HONDURAS: Corozal-Pachacan Road, *Gentle* 50; *Lundell* 4786.

3. *THUNBERGIA FRAGRANS* Roxb. Pl. Corom. 1: 47. 1795.

Thunbergia volubilis Pers. Syn. Pl. 2: 179. 1806.

A slender climbing vine up to 2 meters long; stems grooved, minutely strigose or glabrate; petioles slender, up to 4 cm. long; leaf blades ovate to ovate-lanceolate, 4 to 11 cm. long, 1.5 to 6 cm. wide, acuminate, acute, or occasionally obtuse at apex, subtruncate, cordate, or hastate at base, entire or remotely few-toothed toward base, thin, minutely strigose or glabrate; flowers axillary; peduncles up to 7 cm. long; spathe valves ovate or ovate-lanceolate, 1.5 to 2 cm. long, 6 to 13 mm. wide, acute or acuminate, pubescent; calyx about 5 mm. long, the segments (usually 12) up to 3 mm. long, subulate; corolla pure white, the lobes subtruncate at tip, about as long as the tube and throat; capsule depressed-globose, about 8 mm. in diameter, puberulent, tipped by a stout subulate beak 1 to 1.5 cm. long.—Roadsides, thickets, and waste places; tropical America generally. A native of India.

GUATEMALA, DEPT. PETÉN: La Libertad, *Aguilar* 375.

3. *LOUTERIDIUM* S. Wats.

Shrubs; leaves petiolate, crenate or entire; flowers borne in narrow, nearly naked, terminal panicles or racemes; bracts small; calyx segments 3; corolla large, red or yellowish, the tube very short, abruptly expanded into a broad often hoodlike throat, the lobes 5, short, subequal; stamens 2 or 4, exserted, the anther cells parallel; capsule sessile, the locules 6- to 8-seeded.

Leaves ovate or cordate, pubescent; stamens 2.....1. *L. donnell-smithii*
Leaves oblong-elliptic, glabrous; stamens 4.....2. *L. chartaceum*

1. *LOUTERIDIUM DONNELL-SMITHII* S. Wats. Proc. Amer. Acad. 23: 284. 1888.

A succulent shrub 2 to 3 meters high; stems finely pubescent; leaf blades large, ovate or cordate, 10 to 35 cm. long, 6 to 23 cm. wide, acuminate, rounded or cordate at base, densely and softly pubescent, especially beneath; flowers borne in large terminal glandular-pubescent panicles; calyx segments lanceolate, 3 to 4 cm. long at maturity, acute or acuminate, pubescent, the margins thin and glabrous, the posterior segment carinate, folding over the margins of the two flat anterior segments; corolla 5 to 6 cm. long, green flushed with brown, the short tube abruptly expanded into a large hoodlike throat, the lobes triangular, spreading; stamens 2, exserted; cap-

sules 2.5 to 3 cm. long, glabrous to sparingly glandular-pubescent.—Humid forests; Guatemala and British Honduras.

BRITISH HONDURAS: Toledo, *Peck* 780; *Schipp* 1110.

GUATEMALA, DEPT. PETÉN: Sayab, *Lundell* 2081.



FIG. 1.—*Louteridium chartaceum* Leonard, sp. nov. Plant, half nat. size.

2. *Louteridium chartaceum* Leonard, sp. nov.

FIG. 1.

Frutex glaber; folia oblongo-elliptica, apice acuminata, basin versus sensim angustata; panicula terminalis, laxa; calycis laciniae oblongo-lineares, acutæ; corolla galbina; capsula cylindrica; semina alba.

A glabrous shrub; leaf blades oblong-elliptic, 15 to 18 cm. long, 4 to 5.5 cm. wide, acuminate at apex, narrowed at base and decurrent on the petiole,

entire, the costa and lateral veins (10 or 12 pairs) prominent, the cystoliths minute and inconspicuous; petioles slender, about 5 cm. long; flowers few, borne in a slender loose terminal panicle, the internodes 6 to 12 cm. long, the branches opposite, up to 1.5 cm. long, simple or forked, 4- to 7-jointed, the bracts ovate, acute, deciduous, leaving prominent scars, the pedicels 3 to 4 cm. long; calyx segments linear-oblong, up to 2.5 cm. long, 3 to 4 mm. wide at base, gradually narrowed to 2 mm. near tip, acute, nearly equal; corolla 3 cm. long, about 2 cm. in diameter, yellowish green, the lobes about 1 cm. long; stamens about 6 cm. long, the filaments sparingly pubescent, curved near base and united to about 1 mm. above point of insertion, the anthers 8 mm. long; style about as long as stamens, the stigma 2-lobed, the lobes flat, oval, about 1.5 mm. long; capsule cylindric, 2 to 2.5 cm. long, 4 to 5 mm. in diameter; seeds flat, white, the margins pubescent, the flat surfaces roughened.

Type in the U. S. National Herbarium, No. 1,589,669, collected at Gracie Rock, Sibun River, British Honduras, March 24, 1935, by Percy H. Gentle (No. 1526).

Although strikingly typical of the genus in most respects, *L. chartaceum* is unique in having four fertile stamens instead of two. It is further characterized by its narrow chartaceous calyx segments.

4. LEPIDAGATHIS Willd.

1. LEPIDAGATHIS ALOPECUROIDEA (Vahl) R. Br.; Griseb. Fl. Br. W. I. 453. 1861.

Ruellia alopecuroidea Vahl, Eclog. 2: 49. 1798.

Teliostachya alopecuroidea Nees in Mart. Fl. Bras. 9: 72. 1847.

Herb; stem up to 50 cm. long, usually branched, erect, decumbent, or ascending, sometimes rooting at the lower nodes, short-pilose; petioles up to 2 cm. long; leaf blades thin, ovate to elliptic, 3 to 8 cm. long, 2 to 3 cm. wide, acute or obtuse at apex, narrowed at base, repand or entire; spikes usually terminal, 2 to 8 cm. long, 1 to 1.5 cm. in diameter, many-flowered; bracts lanceolate to oblong, about 6 mm. long, venose, ciliate; calyx segments unequal, 4 to 6 mm. long, the anterior pair lanceolate, connate at base, the lateral pair linear, the posterior segment obovate; corolla white or violet, about as long as the calyx; stamens 4, free at base, anther sacs parallel, slightly unequal, blunt at base; capsule sessile, glabrous, 4-seeded, about 4 mm. long.—Wet shaded banks in woods, thickets, and fields; Central America to northern South America and West Indies.

BRITISH HONDURAS: Manatee Lagoon, Peck 330. San Antonio, Bartlett 13024. Sittee River, Schipp 135. Mountain Pine Ridge, Bartlett 11754.

5. BARLERIA L.

1. BARLERIA MICANS Nees in Benth. Bot. Voy. Sulph. 146. 1844.

Herbaceous or suffruticose, up to 1.5 meters high; leaves ovate to narrowly lanceolate, up to 25 cm. long and 8 cm. wide, long-acuminate, attenuate or abruptly decurrent at base, entire, sparingly strigose or hirtellous; flowers borne in a dense sessile terminal spike, 3 to 8 cm. long and 3 cm. wide; bracts lance-ovate to broadly ovate, 1 to 1.5 cm. long, 5 to 7 mm. wide, acute or obtuse, strigose and hirsute-ciliate, bluish when dry; lateral bractlets linear, 1.5 to 2 cm. long; calyx segments very unequal, the an-

terior oblong, 1.5 to 2 cm. long, 1 to 1.4 cm. wide, bidentate at apex, the posterior segment slightly longer and narrower, acuminate at apex, the lateral segments narrowly lanceolate and about one-half as long as the outer; corolla 5 to 5.5 cm. long, yellow, turning bluish purple when dry, the tube slender, the 5 lobes oblanceolate, subequal, spreading; stamens 2; seeds 2 in each cell.—Southern Mexico to Colombia.

CAMPECHE: Tuxpeña, *Lundell* 1334.

BRITISH HONDURAS: El Cayo, *Bartlett* 11478.

6. BRAVAISIA DC.

Shrubs or small trees; leaves petioled, opposite, entire; inflorescence a terminal subcorymbose panicle, each flower subtended by a pair of bracts; calyx segments 5, subcoriaceous; corolla white or purplish, the tube short, the throat campanulate, the lobes 5, subequal, rounded, spreading; stamens 4, the anther cells contiguous, spurred at base; ovules 2 to 4 in each cell.

Bractlets longer than the calyx; segments of calyx obtuse to acute, not

mucronate

1. *B. tubiflora*

Bractlets shorter than the calyx; segments of calyx mucronate

2. *B. proxima*

1. BRAVAISIA TUBIFLORA Hemsl.; Hook. Ic. Pl. 16: pl. 1516. 1886.

A tree up to 8 meters high; stems gray and glabrous, pubescent upward; leaf blades oblong-lanceolate or elliptic, up to 7.5 cm. long and 3.5 cm. wide (those at the tips of the branches usually much smaller), short-acuminate, obtuse at tip, subcoriaceous, subglabrous; petioles 5 to 10 mm. long; flowers borne in the axils of the uppermost leaves, sessile; bractlets obovate-spatulate, exceeding the calyx; calyx segments oblong, 5 to 7 mm. long, obtuse to acute, about equal, ciliate; corolla purplish-white, about 2.5 cm. long, pubescent, the lobes rotund to oblong, emarginate, 5 to 8 mm. long; stamens reaching mouth of corolla, the anthers calcarate; capsules ovoid, glabrous.—Coastal regions; Yucatan Peninsula and Cuba.

CAMPECHE: Canasayab, *Lundell* 1414. Ciudad del Carmen, *Mell* 2001.

YUCATAN: Calatmul, *Gaumer* 1873. Chichankanab, *Gaumer* 1547, 1872, 23650, 23662. Cozumel, *Gaumer* 52; *Millsbaugh* 1580. Port Silam, *Gaumer* 618. Progreso, *Goldman* 600; *Millsbaugh* 206, 1733; *Seler* 3819. Sisal, *Gaumer* 23227.

BRITISH HONDURAS: Corozal District, *Gentle* 380. Fresh Water Creek, *Stevenson* 1. Maskall, *Gentle* 1193. Orange Walk, *Winzerling* VIII-14. Without definite locality, *Stevenson* in 1927.

2. BRAVAISIA PROXIMA Blake, Contr. Gray Herb. n. ser. 52: 96. 1917.

Shrub or small tree; branches glabrous; leaf blades elliptic-ovate or obovate, 5.5 to 12 cm. long and 2.4 to 3.8 cm. wide, acute or abruptly short-acuminate at apex, narrowed at base, entire, glabrous; petioles 4 to 9 mm. long; flowers borne at the tips of the branches of a trichotomously forked panicle; bractlets ovate or oblong-ovate, 4 to 4.5 mm. long, 1.6 to 1.8 mm. wide, obtuse and mucronate at apex, ciliate, otherwise glabrous; calyx segments oblong, 8 mm. long, 2.3 mm. wide, puberulous, obtuse and mucronate at apex; corolla pale purplish, 3.5 to 3.7 cm. long, pubescent, the tube slender, 6 mm. long, the throat campanulate, 1.7 cm. long, the lobes subequal, cuneate-suborbicular, about 1 cm. long and 1.3 cm. wide; stamens 7 to 13 mm. long.—Forests of British Honduras.

BRITISH HONDURAS: Jacinto Hills, *Schipp* 1259. Upper Moho River, *Peck* 730 (type).

7. BLECHUM P. Br.

Perennial herbs; leaves petioled, crenate, repand-dentate, or entire; flowers borne in dense terminal spikes, the bracts imbricate; calyx 5-parted, the slightly unequal segments linear-subulate; corolla whitish, the tube slender, the limb nearly equally 5-lobed; stamens 4, didynamous, the anther sacs parallel; ovules few in each cavity; capsule broadly oblong with a short narrowed base.

Leaves cordate 1. *B. cordatum*
 Leaves obtuse or narrowed at base 2. *B. pyramidatum*



FIG. 2.—*Blechum cordatum* Leonard, sp. nov. A, plant, half nat. size; B, flower bract; C, calyx spread to show segments; D, pair of stamens; E, corolla lobe. (B, C, E, nat. size; D, twice nat. size.)

1. *Blechum cordatum* Leonard, sp. nov.

FIG. 2.

Herba, caule pubescente, nodis inferioribus radicatis; folia cordata, obtusa, crenata, minute pilosa; spicæ terminales; bractæ oblongo-ovatae, obtusæ; calycis laciniae subulatae, ciliatae; corollæ alba (?).

Herb; stems ascending, rooting at the lower nodes, pilosulous, up to 30 cm. long; nodes 5 cm. long or less; leaf blades cordate, up to 4.5 cm. long and 3.5 cm. wide, obtuse at apex, cordate at base, firm, crenate (the teeth 2 to 3 mm. wide at base), blackish when dry, the prominent veins rather densely pilosulous, the leaf surface sparingly so; petioles up to 1.5 cm. long, densely pilosulous; spikes terminal, about 2 cm. long and 1.5 cm. wide; bracts oblong-ovate, the larger 13 mm. long and 6 mm. wide, all obtuse at tip,

drying dark bluish green, glabrous, bearing cystoliths 0.5 to 0.75 mm. long, ciliate; flowers 1 or 2 in the axil of each bract; calyx 1 cm. long, drying bluish green, the segments 5 to 6 mm. long, 1.5 mm. wide at base, subulate, ciliate; corolla white (?), minutely pubescent, about 1.5 cm. long (immature), the lobes oval, about 4 mm. broad; stamens didynamous, united at base, one filament of each pair 3 mm. long, the other 0.5 mm., all glabrous above, pilosulous at base; anthers oblong, 1.5 mm. long; style about 8 mm. long, stigma narrowly linear-lanceolate; ovary pubescent at tip; ovules 5 or 6 in each cavity.

Type in the herbarium of the University of Michigan, collected on red loam bank of the Sibun River, Belize District, British Honduras, February 4, 1931, by H. H. Bartlett (No. 11355).

Easily recognized by its cordate crenate leaves.

2. *BLECHUM PYRAMIDATUM* (Lam.) Urb. Repert. Sp. Nov. Fedde 15: 323. 1918.

Ruellia blechum L. Syst. ed. 10, 1120. 1759.

Barleria pyramidata Lam. Encycl. 1: 380. 1783.

Blechum brownei Juss. Ann. Mus. Paris 9: 270. 1807.

Ruellia parviflora Sessé & Moc. Fl. Mex. ed. 2, 147. 1894.

Blechum blechum Millsp. Field Mus. Bot. 2: 100. 1900.

Herb; stems erect or ascending, 20 to 70 cm. high, the branches slender, more or less puberulent; leaves ovate, 2 to 7 cm. long, 1 to 5 cm. wide, acute or obtuse at apex, obtuse or narrowed at base, glabrous or sparingly pilose, thin; spikes dense, 4-sided, 3 to 6 cm. long; bracts ovate, pinnately veined, 1 to 2.5 cm. long, about 1 cm. wide, acutish at apex, rounded at base, loosely strigose and ciliate; corolla whitish, a little longer than the subtending bract; capsule broadly oblong, about 6 mm. long, puberulent.—Banks, fields, woods, and thickets, and sometimes in cultivated land; West Indies, tropical America, and the Old World.

CAMPECHE: Champoton, *Steere* 1789. Tuxpeña, *Lundell* 902.

YUCATAN: Chichankanab, *Gaumer* 1693, 2271, 23732. Chichen Itza, *Steere* 1078, 1510. Cozumel, *Gaumer* 93; *Millspaugh* 1506. Izamal, *Gaumer* 358; *Millspaugh* 171. Kancabconot, *Gaumer* 23553. Merida, *Seler* 3846, 3936; *Valdez* 84. San Anselmo, *Gaumer*, 1228, 1692. Without definite locality, *Gaumer* 24062, 24441.

BRITISH HONDURAS: Belize, *Lundell* 4212. Caves, *Schipp* 875. Honey Camp, *Lundell* 24. Little Cocquericot, *Lundell* 4154. Sittee River, *Schipp* 134.

GUATEMALA, DEPT. PETÉN: La Libertad, *Aguilar* 192; *Lundell* 2170. Uaxactun, *Bartlett* 12247.

8. *HYGROPHILA* R. Br.

1. *HYGROPHILA GUIANENSIS* Nees in Hook. Lond. Journ. Bot. 4: 634. 1845.

Hygrophila conferta Nees in Mart. Fl. Bras. 9: 21. 1847.

A branched herb up to 50 cm. high, sparingly hirtellous to glabrate, the stem obtusely quadrangular; leaf blades lanceolate, 5 to 15 cm. long, 0.5 to 3 cm. wide, acuminate at both ends, entire; flowers sessile, clustered in the axils; calyx segments 5, lanceolate, about 5 mm. long, white-margined, pilose; corolla white or purplish, puberulent, the tube 5 mm. long, the upper lip bidentate, 2.5 mm. long, the lower lip 3-lobed; stamens 4, didynamous,

the filaments of each pair united at base; capsules narrowly oblong, 1.2 to 1.4 cm. long, glabrous, 16- to 18-seeded.—Marshy places usually along streams; Mexico, West Indies, and northern South America.

BRITISH HONDURAS: Rio Grande, *Peck* 759; *Schipp* 1109.

9. RUELLIA L.

Perennial herbs or shrubs; leaves petioled, entire or rarely dentate; flowers usually large and showy, solitary or clustered in the axils, or borne in terminal cymose panicles; calyx usually 5-parted, the segments often narrow; corolla red, yellow, white, or purple (usually mauve), funnellform or salverform, sometimes saccate, the tube usually narrow, the limb of 5 obtuse spreading lobes; stamens 4, didynamous, the anther sacs blunt at base; stigma lobes unequal; capsules oblong, or clavate.

Calyx 3-parted by the partial union of two pairs of segments 1. *R. tweedii*

Calyx 5-parted.

Flowers sessile, axillary or terminal.

Leaves sparingly pilose or hirtellous, usually less than 2 cm. wide; calyx segments similar.

Blades (at least the uppermost) sparingly pilose, the hairs up to 1.5 mm. long; capsule puberulent, narrowed to a slender solid stipe 2. *R. pygmaea*

Blades minutely pubescent, the hairs less than 0.5 mm. long; capsules densely pubescent, narrowed to a short thick base 3. *R. geminiflora*

Leaves densely pilose, usually more than 2 cm. wide; posterior segment of the calyx wider and longer than the anterior ones.

Corolla 5 to 8 cm. long; leaf blades mostly acute at apex 4. *R. harveyana*

Corolla 2 cm. long; leaf blades mostly rounded at apex 5. *R. obtusata*

Flowers in panicles.

Ovary and capsule glabrous.

Pubescence eglandular; flowers secund at the end of long, more or less horizontal peduncles 6. *R. stemonacanthoides*

Pubescence, or at least some of the hairs, glandular; flowers not secund.

Corolla 1.5 to 2 cm. broad at throat; capsule 2 to 3 cm. long 7. *R. malacosperma*

Corolla 1 cm. broad or less at throat; capsule 1.5 cm. long or less.

Capsules cylindric 8. *R. paniculata*

Capsules clavate, flattened 9. *R. inundata*

Ovary and capsules puberulent.

Leaves puberulent (often grayish) 10. *R. nudiflora* var. *occidentalis*

Leaves glabrous or sparingly pilosulous 11. *R. nudiflora* var. *yucatanica*

1. RUELLIA TWEEDII (Nees) Anders. Ann. N. Y. Acad. 7: 192. 1893.

FIG. 3.

Blechnum tweedii Nees in DC. Prodr. 11: 466. 1847.

Blechnum mexicanum Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 169. 1854.

Herb up to 40 cm. high or more; stems ascending, glabrous or pilosulous; petioles slender, 3 to 10 mm. long; leaf blades ovate, 1.5 to 5.5 cm. long, 0.5



FIG. 3—*Ruellia tweedii* (Nees) Andr. A, plant, nat. size; B, calyx spread to show segments; C, cell of mature capsule. (B, C, twice nat. size.)

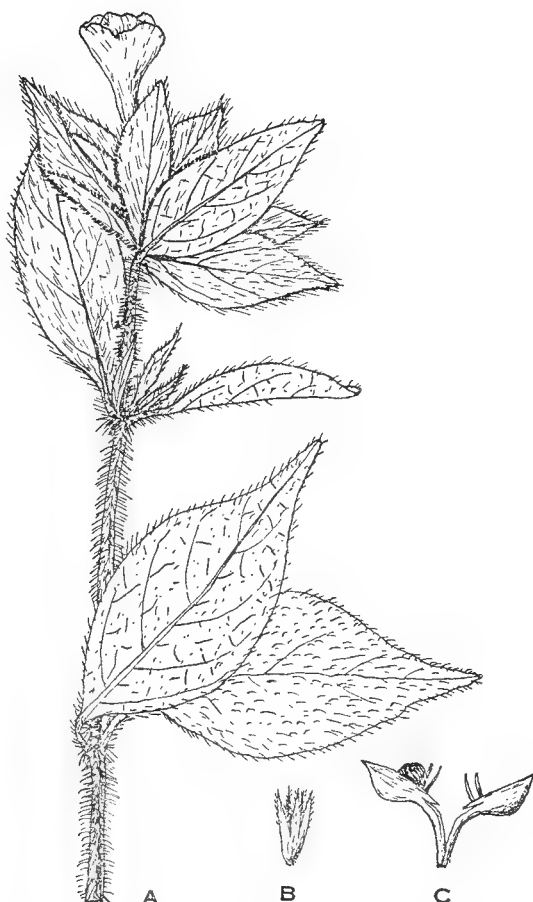


FIG. 4—*Ruellia pygmaea* Donn. Smith. A, plant, nat. size; B, calyx; C, mature capsule. (B, C, twice nat. size.)

to 2.7 cm. wide, narrowed to a blunt tip, obtuse or acute at base and decurrent on the petiole, entire, glabrous or sparingly pilosulous, more or less covered with minute glandular scales; flowers several, sessile, crowded in a headlike cluster at the tips of the branches; bracts leaflike; calyx 5 to 6 mm. long, sparingly pilosulous, lepidote, irregular, the segments 5 to 6 mm. long, 1 mm. wide, one distinct, the other four united into two pairs for about one-fourth their length; corolla blue, finely pilosulous, 2 to 2.5 cm. long, the lobes suborbicular, 7 to 8 mm. in diameter, emarginate; capsules oval, 7 to 8 mm. long, abruptly pointed at apex, narrowed at base, glabrous, lepidote, 4-seeded; seeds flat, oval, appressed-pubescent when dry, mucilaginous-tomentose when moistened.—Southern Mexico, Panama, and Paraguay,

YUCATAN: Izamal, *Gaumer* 384; *Greenman* 484. Merida, *Seler* 3948; *Valdez* 24.

2. *RUELLIA PYGMÆA* Donn. Smith, Bot. Gaz. 48: 298. 1909. FIG. 4.

Herb up to 30 cm. high; stem ascending, pilosulous; leaf blades oblong-ovate, 1 to 5 cm. long, 0.5 to 2.5 cm. wide, acuminate at apex (the tip itself blunt), rounded at base, entire, both surfaces more or less pilose but not densely so, the hairs up to 1.5 mm. long; flowers sessile, axillary; calyx 4 mm. long, sparingly pubescent, the segments narrowly lanceolate; corolla about 2.5 cm. long, blue, finely pubescent, the limb 6 to 8 mm. broad; capsule 8 to 9 mm. long, narrowed to a slender solid base about 4 mm. long, sparingly puberulent, 4-seeded.—Open places: Guatemala and British Honduras.

BRITISH HONDURAS: Ocotal, *Schipp* 668.

3. *RUELLIA GEMINIFLORA* H.B.K. Nov. Gen. & Sp. 2: 240. 1817. FIG. 5.

Dipteracanthus geminiflorus Nees in Mart. Fl. Bras. 9: 40. 1847.

Herb up to 50 cm. high; the stems erect or ascending, pilosulous; leaf blades ovate, oblong, or lanceolate, short-petioled, 1.5 to 5 cm. long, 0.5 to 2 cm. wide, obtuse or acutish at apex, narrowed at base, entire, hirtellous; flowers axillary; calyx 10 mm. long or less, pilosulous, the segments linear-lanceolate; corolla mauve, pubescent, usually 2.5 to 3 cm. long, the lobes suborbicular, 5 to 10 mm. wide; capsule 8 mm. long, 4 mm. wide, puberulent, 4-seeded, the seeds apparently glabrous when dry, mucilaginous-pubescent when moistened.—Fields and waste places; Central America, West Indies, and northern South America.

BRITISH HONDURAS: All Pines, *Schipp* 761. Mountain Pine Ridge, *Bartlett* 11814.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 2286, 3485, 3581, 3672, 4884.

4. *RUELLIA HARVEYANA* Stapf, Bot. Mag. 139: pl. 8485. 1913. FIG. 6.

Ruellia longipila Standl. Field Mus. Bot. 8: 44. 1930.

Herb, up to 40 cm. high; stem erect, ascending or geniculate, the pubescence a mixture of short and long hairs; petiole up to 10 mm. long, pilose; leaf blades ovate to oblong-elliptic or oblong-lanceolate, 2 to 10 cm. long, 1.5 to 5 cm. wide, obtuse or acutish at apex, rounded or narrowed at base, entire, both surfaces rather densely pilose; flowers few, solitary, axillary, terminal or subterminal; calyx pilose, irregular, the posterior segment lanceolate, 1.5 to 2.5 cm. long, the four anterior segments linear-lanceolate, 1 to

1.5 cm. long, keeled; corolla mauve, 5 to 8 cm. long, finely pubescent, the lobes rounded, 1 to 2 cm. broad; filaments 6 to 13 mm. long; capsule 1.5 cm. long, glabrous except the narrow rhomboid calluses at apex (these pilose), 6- to 8-seeded; seeds flat, 3 mm. long, 2 to 2.5 mm. wide, appressed-pilose when



FIG. 5—*Ruellia geminiflora* H.B.K. A, plant, nat. size; B, calyx; C, capsule. (B, C, twice nat. size.)

dry, mucilaginous when wet, the hairs spreading.—Thickets; British Honduras and Guatemala.

BRITISH HONDURAS: Roaring Creek, *Lundell* 322. San Antonio, *Bartlett* 13063. Stann Creek, *Stocker* 20 (type of *R. longipila*); *Schipp* 976.

5. *RUELLIA OBTUSATA* Blake, Contr. Gray Herb. n. ser. 52: 105. 1917.

Suffrutescent; stems up to 60 cm. long or more, pilose, or subglabrate below; leaves distant, the blades oval to oblong-oval, 4.5 to 6 cm. long, 1.8 to 2.5 cm. wide, obtuse or rounded at apex, acute at base, entire, both surfaces densely pilose; petioles 5 to 8 mm. long, pilose and puberulent; flowers solitary, borne in the axils of the leaves; bracts leaflike; calyx hispid-pilose, the posterior segment lanceolate, 12 mm. long, the four anterior segments linear-subulate, about 9 mm. long; corolla pilose, about 2 cm. long, the lobes suborbicular, 9 mm. long and 8 mm. wide; capsule 14 mm. long, glabrous, 10-seeded.—Damp open ground; British Honduras.

BRITISH HONDURAS: Toledo, *Peck* 871 (type).

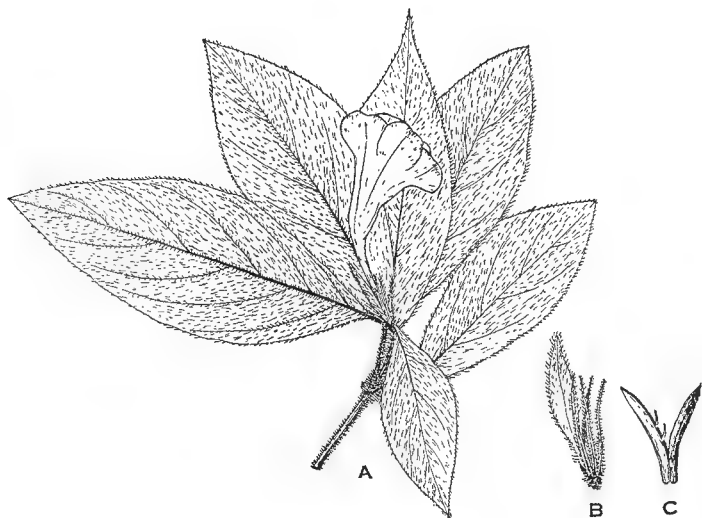


FIG. 6—*Ruellia harveyana* Stapf. A, plant, half nat. size; B, calyx; C, mature capsule. (B, C, nat. size.)

6. *RUELLIA STEMONACANTHOIDES* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 507. 1882. FIG. 7.

Arrhoxylum stemonacanthoides Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 130. 1854.

Ruellia pereducta Standl. Carnegie Inst. Wash. Pub. No. 461: 89. 1935.

Suffrutescent, up to 3 meters tall; stem puberulent or glabrate; leaf blades oblong-ovate to oblong-lanceolate, 6 to 16 cm. long, 1.5 to 8 cm. wide, acuminate at apex (the tip blunt or minutely cuspidate), rounded or narrowed at base, firm, entire, glabrous, or the veins and costa of the lower surface puberulent; petioles 1 to 9 cm. long; inflorescence axillary, peduncled, dichotomous, sometimes a terminal panicle, peduncles up to 17 cm. long, quadrangular, curved, the flowers more or less secund; bracts leaflike; calyx up to 1 cm. long, puberulent or glabrate, the segments linear-subulate; corolla purple, salverform, 3 to 4 cm. long, the lobes oval, about 9 mm. long and 8 mm. wide, shallowly emarginate; filaments 6 to 10 mm. long; capsule 16 mm. long, glabrous, 12-seeded; seeds flat, 2.5 mm. in diameter, apparently glabrous when dry, mucilaginous and puberulent when moistened.—Forests, usually in wet situations; Campeche and British Honduras to Costa Rica.

CAMPECHE: Monterrey, *Lundell* 1239 (type of *R. pereducta*).

BRITISH HONDURAS: Camp 31, B. H. G. Survey, *Schipp* 645. El Cayo, *Bartlett* 12900; *Chanek* 39.

GUATEMALA, DEPT. PETÉN: Santa Cruz, *Bartlett* 12388. Uaxactun, *Bartlett* 12160. Yaxha-Remate Road, *Lundell* 4094.

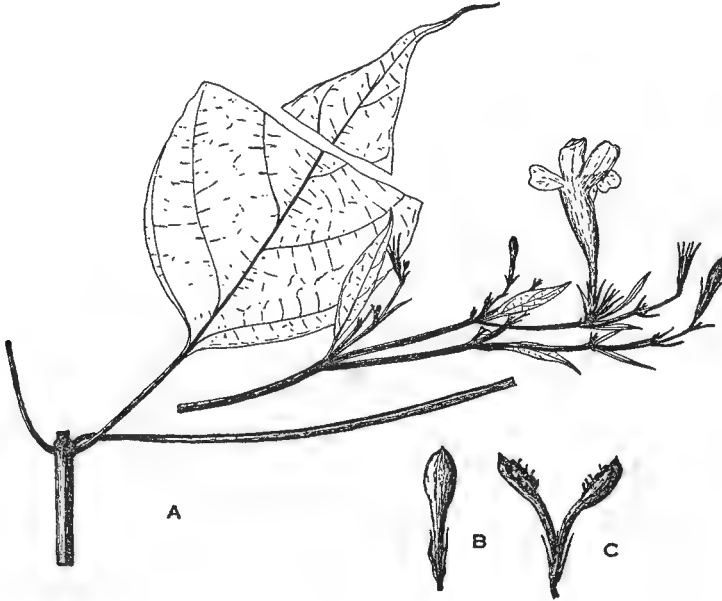


FIG. 7—*Ruellia stemonacanthoides* (Oerst.) Hemsl.
A, plant, half nat. size; B, capsule; C, mature capsule
with cells spreading elastically. (B, C, nat. size.)

7. *RUELLIA MALACOSPERMA* Greenm. Proc. Amer. Acad. 34: 572. 1899.

FIG. 8.

Herbaceous; stem up to 60 cm. high, glabrous or sparingly pilose; leaf blades lanceolate to oblong-elliptic, up to 12 cm. long and 3.5 cm. wide, gradually narrowed to an acute or obtuse tip, narrowed at base, undulate, glabrous or the costa and margins pilose; petioles 0.5 to 3 cm. long, glabrous or pilose; inflorescence axillary, once- or twice-dichotomous, the peduncles slender, 3 to 6 cm. long, glabrous; calyx 1.2 to 2 cm. long, more or less glandular-puberulent or sometimes glabrate, the segments linear-subulate; corolla mauve, finely pubescent, up to 6 cm. long, the tube 1 to 1.5 cm. long, the throat funnelform or campanulate, slightly oblique, the limb 3 to 4.5 cm. broad, the lobes rounded; capsule 2 to 3 cm. long, cylindric, glabrous except for the apical calluses (these puberulent), usually 20-seeded.—Lowlands of Mexico and Central America.

YUCATAN: Chichankanab, *Gaumer* 2277. San Anselmo, *Gaumer* 1236. Without definite locality, *Gaumer* 23910.

BRITISH HONDURAS: Corozal District, *Gentle* 347.

8. *RUELLIA PANICULATA* L. Sp. Pl. 635. 1753.

FIG. 9.

Ruellia viscosa H.B.K. Nov. Gen. & Sp. 2: 239. 1817.

Dipteracanthus paniculatus Nees in DC. Prodr. 11: 142. 1847.

Herbaceous or suffrutescent; stems up to 1 meter long, erect, ascending, or sometimes procumbent and rooting at the nodes, the pubescence a mixture

of minute grayish hairs and longer glandular ones; petioles slender, 1 to 4 cm. long; leaf blades ovate or oblong-ovate, 3 to 17 mm. long, 1.5 to 6.5 cm. wide, obtuse or acute at apex, abruptly narrowed at base, glandular-pubescent, grayish-puberulent, or glabrate; inflorescence axillary, divaricate or ascending, dichotomous; bracts leaflike, glandular-pubescent, those subtending the flowers 2 to 10 mm. long, 1 to 4 mm. wide; calyx 1 to 1.5 cm. long, glandular-pubescent, the segments linear-subulate, unequal; corolla blue, finely pubescent, 2 to 3 cm. long, the lobes oval, 6 to 7 mm. long, 5

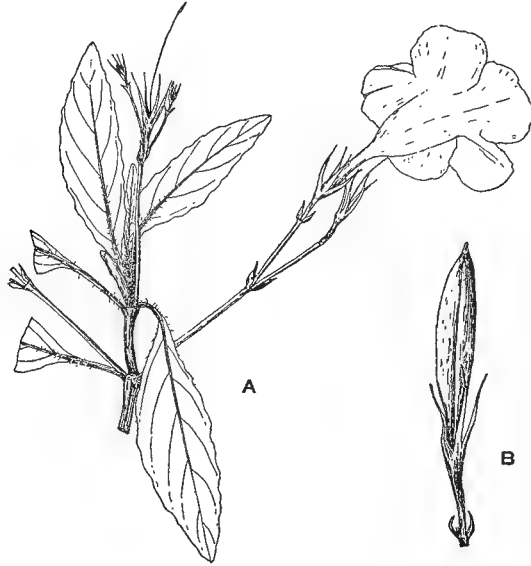


FIG. 8—*Ruellia malacosperma* Greenm. A, plant, half nat. size; B, capsule and calyx, nat. size.

mm. wide; capsule cylindric, 10 to 13 mm. long, 2 mm. in diameter, erect, pointed, glabrous, 8-seeded; seeds flat, 2 mm. long, 1.5 mm. wide, mucilaginous-pubescent when moistened.—Waste places; Mexico to Colombia and Venezuela, and West Indies.

CAMPECHE: Canasayab, *Lundell* 1420.

YUCATAN: Chicankanab, *Gaumer* 1441, 2279, 23659. Pocoboch, *Gaumer* 2387. Progreso, *Flores* in 1934; *Millspaugh* 1685. San Felipe, *Gaumer* 1420. Silam, *Gaumer* 1241.

9. *RUELLIA INUNDATA* H.B.K. Nov. Gen. & Sp. 2: 239. 1817.

FIG. 10.

Aphragmia haenkei Lindl. Nat. Syst. 444. 1836.

Dipteracanthus haenkei Nees in DC. Prodr. 11: 141. 1847.

Herbaceous or suffrutescent, up to 2 meters high; stem simple or branched, the tip glandular-pilose, the lower portions becoming whitish and glabrate; leaf blades lance-oblong to ovate, up to 15 cm. long and 7 cm. wide, acuminate at apex, acute or rounded at base, denticulate, repand-crenulate, or subentire, hispidulous or occasionally grayish-pubescent beneath; petioles up to 9 cm. long, pilose; inflorescence axillary, erect or ascending, dichotomous, glandular-pubescent, sometimes a dense cylindric panicle; bractlets

oblong, 3 to 8 mm. long, 1 to 3 mm. wide; calyx 8 to 15 mm. long, glandular-pilose, the segments linear; corolla purplish, pubescent, 2 to 2.5 cm. long, the lobes rounded, about 5 mm. wide; filaments 7 to 8 mm. long; style 2 to 2.5 cm. long; capsule 8 to 9 mm. long, 3 mm. wide, flattened, pointed, glabrous, 2- to 4-seeded; seeds flat, 4 mm. long, 3 mm. wide, smoothish

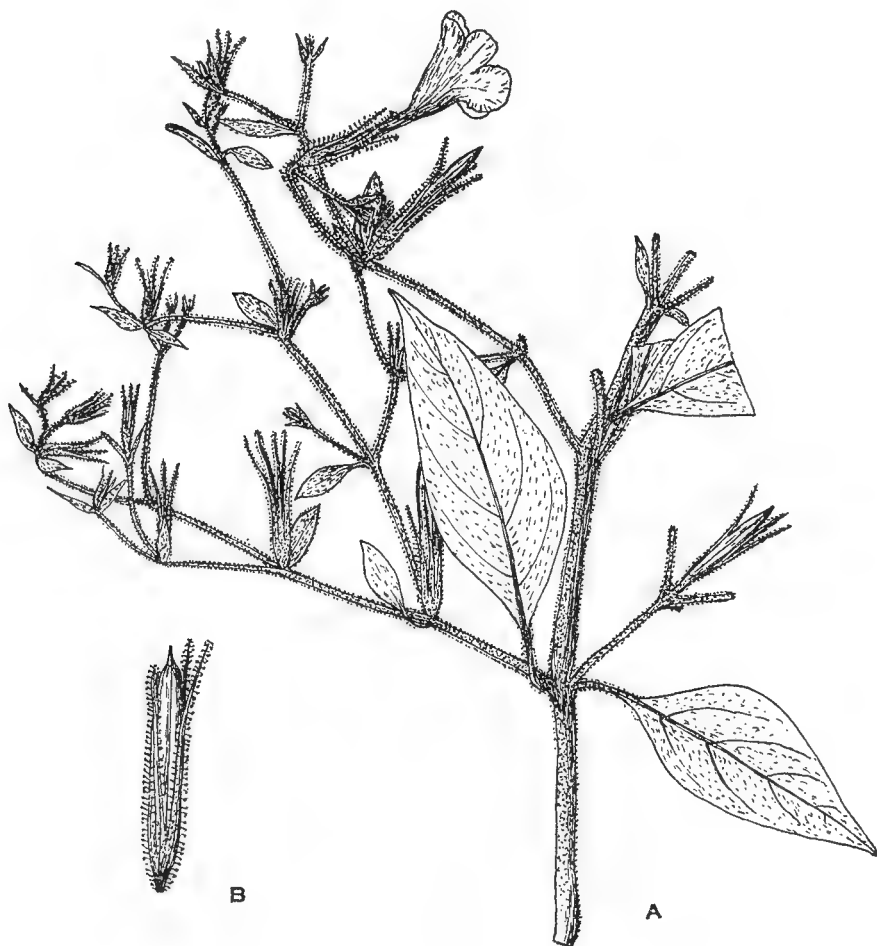


FIG. 9—*Ruellia paniculata* L. A, plant, nat. size;
B, capsule and calyx, twice nat. size.

when dry, mucilaginous-pubescent when moistened.—Dry thickets; Mexico, Central America, and Colombia. The plant often exhales a peculiar strong goatlike odor.

CAMPECHE: Calakmul, *Lundell* 1170. Tuxpeña, *Lundell* 1239.

YUCATAN: Calotmul, *Gaumer* 1695. Chichen Itza, *Goldman* 565; *Mills-paugh* 105, 139; *Steere* 1300. Colonia San Cosme, *Greenman* 352. Izamal, *Gaumer* 360, 23800; *Mills-paugh* 93. Merida, *Seler* 3830; *Schott* 2. Pocomboch, *Gaumer* 24197. San Anselmo, *Gaumer* 1696. Sayí, *Seler* 3889. Xnocac, *Gaumer* 23492. Without definite locality, *Gaumer* 1697.

10. *RUELLIA NUDIFLORA* var. *occidentalis* (A. Gray) Leonard, Jour. Wash. Acad. Sci. 17: 516. 1927. FIG. 11.

Ruellia tuberosa var. *occidentalis* A. Gray, Syn. Fl. 2¹: 325. 1878 (in part).

Herb up to 60 cm. high; stem branched, glandular-pubescent; petioles 1 to 4.5 cm. long; leaf blades ovate, 4 to 18 cm. long, 2.5 to 8 cm. wide, obtuse or rounded at apex, rounded or subcordate at base, undulate or crenate, grayish-puberulent, more or less glandular; inflorescence a large terminal panicle, or an interrupted spike of verticillasters; bracts linear, 5 to 10 mm. long; corolla purple, finely pubescent, 4 to 6 cm. long, the limb 2 to 3 cm. wide; stamens 10 to 14 mm. long; capsule 15 to 17 mm. long, puberulent, some of the hairs glandular.—Clearings; New Mexico, Texas, and Mexico.

YUCATAN: Uxmal, Steere 2003.

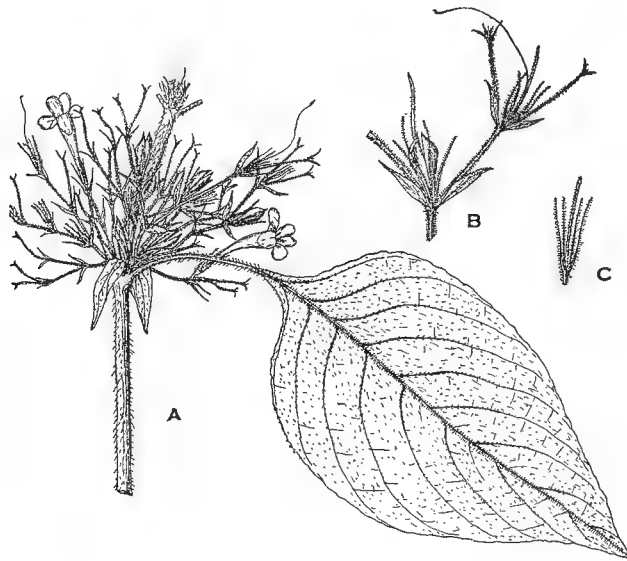


FIG. 10—*Ruellia inundata* H.B.K. A, plant, half nat. size; B, portion of inflorescence with capsule; C, calyx. (B, C, nat. size.)

11. *RUELLIA NUDIFLORA* var. *YUCATANA* Leonard, Jour. Wash. Acad. Sci. 17: 518. 1927. FIG. 12.

Herb up to 30 cm. high, the pubescence of the stems a mixture of long and short hairs, some of these glandular; leaves mostly basal; petioles up to 3 cm. long; leaf blades oblong-elliptic or spatulate, 4 to 12 cm. long, 1 to 4 cm. wide, rounded at apex, gradually narrowed at base, pilosulous or glabrate; flowers borne in peduncled, glandular-puberulent cymes, these comprising nearly the entire plant, the lower cymes axillary, the upper forming a naked terminal panicle; calyx 5 to 14 mm. long, glandular-puberulent, the segments subulate, their tips usually curved or twisted; corolla 2.5 to 3 cm. long, purple, finely pubescent, the limb 2.5 cm. broad; filaments 4 to 6 mm. long; capsule 12 mm. long, puberulent.—A weed of open places or occasionally found in woods; Yucatan Peninsula.

CAMPECHE: Champoton, Steere 1725.

YUCATAN: Chichankanab, *Gaumer* 1801. Chichen Itza, *Bequaert* 51; *Steere* 1016. Izamal, *Gaumer* 488, 759 (type). Merida, *Schott* 45, 282; *Valdez* 23. Sayí, *Seler* 3893. Without definite locality, *Gaumer* 24218.

BRITISH HONDURAS: Corozal, *Gentle* 178. Orange Walk Road, *Lundell* 4979. Honey Camp, *Lundell* 36, 365, 634; *Millspaugh* 13.

GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1516. Lake Petén, *Lundell* 3216.

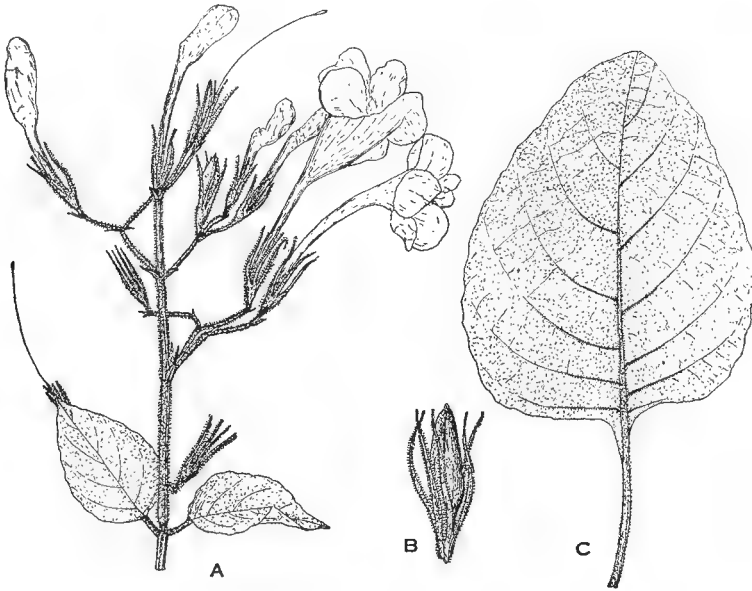


FIG. 11—*Ruellia nudiflora* var. *occidentalis* (Gray) Leonard. A, inflorescence; B, capsule; C, basal leaf. (A, C, half nat. size; B, nat. size.)



FIG. 12—*Ruellia nudiflora* var. *yucatana* Leonard. A, inflorescence; B, capsule and calyx; C, basal leaf. (A, C, half nat. size; B, nat. size.)

10. STENANDRIUM Nees

Small low perennial herbs, usually acaulescent; flowers borne in spikes; calyx segments 5, narrow, nearly equal; corolla pink, white, or purple, the tube slender, slightly curved, the limb oblique, the 5 lobes spreading, unequal; stamens 4, didynamous, included, the anthers 1-celled; ovules 2 in each cavity; capsule fusiform or narrowly oblong, the seeds roughened or pubescent.

Leaf blades subcordate or obtuse at base.....1. *S. subcordatum*
 Leaf blades narrowed at base.....2. *S. guatemalense*

1. STENANDRIUM SUBCORDATUM Standl. Journ. Arn. Arb. 11: 48. 1930.

A small herb; leaf blades ovate to oblong-ovate, obtuse or rounded at apex, obtuse or subcordate at base, entire, finely pubescent; petioles up to 2.5 cm. long; flowers borne in a peduncled spike; flower bracts lance-subulate, 7 mm. long, 1.25 mm. wide, entire, 3-nerved, ciliolate; calyx segments subulate, 4 to 5 mm. long; corolla light purplish, glabrous, about 1 cm. long, the lobes 4 to 6 mm. long, rounded.—Old clearings, Yucatan and Guatemala.

YUCATAN: Chichen Itza, *Bequaert* 20 (type); *Steere* 1451. Tizimin, *Swallen* 2530.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 2295. Uaxactun, *Bartlett* 12283.

2. *Stenandrium guatemalense* Leonard, sp. nov.

FIG. 13.

Herba acaulis; folia ovata, apice obtusa vel rotundata, basin versus sensim angustata et in petiolum decurrentia, tenuia, integra, utrinque pilosa; spicae breves, pedunculatae; bractea lanceolata, 3-nervia, pilosa; calycis laciniae 3-5-striatae; corolla purpurea, sparse puberulenta, lobis subaequalibus; capsula oblonga, glabra.

A small herb; rootstock about 1 cm. long; leaf blades ovate, up to 3 cm. long and 1.4 cm. wide, obtuse or rounded at apex, narrowed at base, thin, entire, both surfaces sparingly pilose, or the costa and lateral veins of the lower surface pubescent (long and short hairs mixed); petiole up to 1 cm. long, both pilose and puberulent, the longer hairs up to 1 mm. long; peduncle up to 4 cm. long, puberulent; spike 1 to 2.5 cm. long; bracts lanceolate, 1 cm. long, 3 mm. wide, sharply acuminate, faintly 3-nerved, pilose and ciliate, the hairs up to 1 mm. long; bractlets subulate, about 4 mm. long, 0.5 mm. wide, pilosulous, 1-nerved; calyx segments lanceolate, 5 to 6 mm. long, 0.5 to 1 mm. wide, 3- to 5-nerved, sparingly pilosulous at tip, the margins minutely papillose below; corolla purple, sparingly puberulent, 10 to 15 mm. long, the tube 6 to 7 mm. long, 2 mm. wide at base, narrowed to 1 mm. near throat; limb about 12 mm. broad, the lobes equal, about 7 mm. long and 4 to 4.5 mm. wide, rounded at tip; pistil 5 mm. long, glabrous; capsule oblong, 7 mm. long, 3 to 4 mm. in diameter, ending in a blunt tip, glabrous or bearing a few minute hairs near apex; retinacula cucullate, the tip abruptly curved and ending in a sharp point; seeds reddish-brown, 2.5 mm. long, 2 mm. wide, pilose, the hairs white and appressed.

Type in the U. S. National Herbarium, No. 1,320,442, collected at Cubilquitz, Department of Alta Verapaz, Guatemala, 1892, by H. von Tuerckheim (No. 3588).

Additional specimens examined:

GUATEMALA: Chiché, Petén, *Lundell* 3707. La Libertad, *Lundell* 3539, 3626, 3679, 4879.

Stenandrium guatemalense can be distinguished from closely related Mexican species by its narrow, sharply acuminate, pilose bracts.



FIG. 13—*Stenandrium guatemalense* Leonard, sp. nov. A, plant; B, corolla; C, bract; D, bractlets; E, calyx spread to show segments. (A, B, C, D, E, twice nat. size.)

11. APHELANDRA R. Br.

Shrubs or large herbs; leaves opposite, petiolate, the blades usually large, oblong or elliptic; flowers red or yellow, borne in large terminal bracted spikes; calyx 5-parted, the segments narrow, subequal or the posterior one larger; corolla tube straight or incurved, sometimes ampliate above, the limb usually bilabiate, the upper lip erect, entire or 2-lobed, the lower reflexed-spreading, 3-lobed; stamens 4; anthers one-celled; ovules 2 in each cell.

Bracts bearing a group of glandular dots on either side of the midrib;

lateral lobes of lower lip very small or obsolete.....1. *A. deppeana*

Bracts without glandular dots; lateral lobes of lower lip of corolla well developed

- Leaf blades lance-oblong to elliptic.....2. *A. aurantiaca*
 Leaf blades linear to narrowly lanceolate.....3. *A. repanda*

1. *APHELANDRA DEPPEANA* Schlecht. & Cham. Linnæa 5: 96. 1830.

Aphelandra cristata H.B.K. Nov. Gen. & Sp. 2: 236. 1817. Not *A. cristata* R. Br. 1810.

Aphelandra pectinata Willd.; Nees in DC. Prodr. 11: 297. 1847.

Aphelandra hankeana Nees in DC. Prodr. 11: 298. 1847.

Shrubs, 1 to 4 meters high; stems pubescent; leaf blades ovate-elliptic to lance-oblong, 5 to 20 cm. long, 2 to 10 cm. wide, acuminate at apex, narrowed and decurrent on petiole at base, entire or undulate, scabrous above, sparingly to densely and softly pubescent beneath; spikes terminal, one to several; bracts lance-ovate, 8 to 15 mm. long, 4 to 6 mm. wide, acuminate, pilosulous, the upper portion with one to several slender teeth, the middle portion bearing a group of glandular dots; corolla pale to bright red or crimson, pubescent, the upper lip erect, 2-lobed, the lower lip spreading, subentire or, if 3-lobed, the lateral lobes very small; capsule 15 mm. long, obtuse, glabrous, 4-seeded.—In woods or open places, southern Mexico to northern South America and the West Indies.

CAMPECHE: Monterrey, *Lundell* 1227.

YUCATAN: Chicheh, *Gaumer* 23798. Chichankanab, *Gaumer* 1488, 1569, 23650. Chichen Itza, *Steere* 1481. Izamal, *Gaumer* 300; *Seler* 3932. Kancabconot, *Gaumer* 23587. Muna, *Gaumer* 2151. Progreso, *Steere* 3012. Sayí, *Seler* 3888. Tepakaam, *Millspaugh* 91. Without special locality, *Gaumer* 24144.

BRITISH HONDURAS: Corozal, *Lundell* 4865, 4969; *Gentle* 202. El Cayo, *Bartlett* 11884, 11942, 11947; *Chanek* 38. Freshwater Creek, *Kinloch* 3. Honey Camp, *Lundell* 504. Lower Belize River, *Record* in 1926. Maskall, *Gentle* 1185, 1304. Mt. Polo, *Bartlett* 11349. Roaring Creek, *Lundell* 439. Stann Creek, *Schipp* 37. Tower Hill Estate, *Karling* 12, 51. Without precise locality, *Stocker* 13.

GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1447. La Libertad, *Lundell* 3004. San Clemente to Dos Arroyos, *Bartlett* 12827.

2. *APHELANDRA AURANTIACA* (Schiedw.) Lindl. Bot. Reg. 31: pl. 12. 1845.

Hemisandra aurantiaca Schiedw. Bull. Acad. Brux. 9¹: 22. 1842.

Aphelandra acutifolia Nees in DC. Prodr. 11: 299. 1847.

Plants herbaceous or suffrutescent, up to 1 meter high; leaves lance-oblong to elliptic, 8 to 30 cm. long, 2.5 to 12 cm. wide, acute or acuminate at apex, narrowed at base, entire, glabrous or nearly so; spikes solitary, terminal; bracts ovate-lanceolate, green or red, puberulent, up to 3 cm. long and 1 cm. wide, acuminate, pectinately toothed; bractlets and calyx segments lanceolate, puberulent and ciliolate; corolla orange-red or scarlet, puberulent, about 6 cm. long, upper lip erect, acute, entire, lower lip 3-lobed, the lateral lobes about one-half as long as the middle; capsule 1.5 cm. long, puberulent.—Wet forests, southern Mexico to northern South America.

BRITISH HONDURAS: Forest Home, *Schipp* 1063.

3. APHELANDRA REPANDA Nees in DC. Prodr. 11: 728. 1847.

Aphelandra aurantiaca var. *stenophylla* Standl. Field Mus. Bot. 4: 324. 1929.

Plant suffrutescent, about 1 meter high; leaf blades narrowly lanceolate, 20 to 25 cm. long, 2.5 to 3 cm. wide, gradually narrowed at each end, glabrous, shining, coarsely sinuate-repand; petiole 1 to 3 cm. long; spike terminal, sessile; bracts oblong, 2.5 cm. long, acuminate, pectinate-dentate; corolla 2.5 to 3 cm. long, orange-scarlet, upper lip erect, entire, lower lip 3-lobed, the lobes subequal, the middle oval, the lateral oblong-lanceolate. —Wet forests, Central America to Peru.

BRITISH HONDURAS: Rio Viejo, *Schipp* 625.

12. ELYTRARIA Michx.

Caulescent or acaulescent herbs; leaves alternate or sometimes subopposite, basal or crowded at the ends of the branches; flowers borne in dense peduncled spikes, both spike and peduncle bearing imbricate coriaceous bracts; calyx scarious, the segments narrow, entire, or sometimes toothed at apex; corolla white or blue, the tube slender, the limb 2-lipped, the upper lip 2-lobed, the lower 3-lobed; stamens 2, barely exerted; anthers 2-celled, the sacs equal, parallel, sometimes awn-tipped at the base; staminodia usually wanting; ovary 2-celled; ovules 6 to 10 in each cavity; capsule narrow, contracted at base, acute at apex.

Flower bracts entire; plants acaulescent.....1. *E. bromoides*

Flower bracts bearing a pair of thin, triangular or rhombic teeth; plants usually caulescent2. *E. squamosa*

1. ELYTRARIA BROMOIDES Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 115. 1854.

Tubiflora acuminata Small, Fl. Southeast. U. S. 1082. 1903.

An acaulescent herb; leaf blades spatulate, usually about 5 cm. long (occasionally as much as 15 cm.), 0.5 to 2 cm. wide near tip, gradually narrowed to base, undulate, sparingly pilose; petiole up to 1 cm. long; spikes solitary, or occasionally a pair, on scale-covered peduncles (2 to 8 cm. long), the scales lance-subulate, 4 to 6 mm. long; bracts closely imbricate, lanceolate, 1 cm. long, 2 mm. wide, glabrous without, puberulent within, ciliolate; calyx segments lanceolate, the upper and lower 2-parted at apex; corolla pink, 5 to 6 mm. long; capsules glabrous, 4 to 5 mm. long, 8-seeded. —Waste places, Texas, Mexico, and Guatemala.

YUCATAN: Chichankanab, *Gaumer* 1833. Chichen Itza, *Millspaugh* 1622; *Steere* 1229, 1447. Peto, *Steere* 2209. Xcholac, *Gaumer* 537.

GUATEMALA, DEPT. PETÉN: Chiché, *Lundell* 3708. La Libertad, *Lundell* 2395, 2471.

2. ELYTRARIA SQUAMOSA (Jacq.) Lindau, Anal. Inst. Fisico-Geog. Costa Rica 8: 299. 1895.

Verbena squamosa Jacq. Pl. Hort. Schoenbr. 1: 3. pl. 5. 1797.

Elytraria tridentata Vahl, Enum. Pl. 1: 107. 1804.

Elytraria frondosa H.B.K. Nov. Gen. & Sp. 2: 234. 1817.

Elytraria fasciculata H.B.K. Nov. Gen. & Sp. 2: 235. 1817.

Elytraria ramosa H.B.K. Nov. Gen. & Sp. 2: 235. 1817.

Elytraria scorpioides Roem. & Schult. Syst. Veg. Mant. 1: 128. 1822.

Elytraria apargiifolia Nees in DC. Prodr. 11: 65. 1847.

Elytraria microstachya Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 114. 1854.

Elytraria pachystachya Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 116. 1854.

Tubiflora squamosa Kuntze, Rev. Gén. Pl. 2: 500. 1891.

Tubiflora pachystachya Kuntze, Rev. Gen. Pl. 2: 500. 1891.

Acaulescent, or the leaves crowded at the tip of a glabrous or sparingly pilosulous stem up to 30 cm. long; leaf blades ovate to oblong or obovate, rarely linear-lanceolate, 1 to 18 cm. long, 0.5 to 6 cm. wide, blunt or acutish at apex, narrowed at base to a slender winged petiole, both surfaces appressed-pilose or glabrate, the margins undulate; scapes numerous, axillary, 1 to 24 cm. long, simple or branched (sometimes leafy at tip), covered by tightly appressed ovate to subulate scales; spikes one to several, up to 6 cm. long; bracts oblong or elliptic, 3 to 6 mm. long, 1 to 2 mm. wide, firm, awn-tipped and bearing near apex a pair of triangular or rhombic hyaline teeth; bractlets 3 mm. long; calyx segments thin, the upper bidentate; corolla blue, 5 to 8 mm. long; capsule oblong, glabrous.—Dry bushy slopes and waste places, Texas to northern South America; West Indies; India and Philippine Islands.

CAMPECHE: Champoton, *Goldman* 541. Esperanza, *Lundell* 1442.

YUCATAN: Calotmul, *Gaumer* 1589. Chichankanab, *Gaumer* 1590. Chichen Itza, *Steere* 1077. Izamal, *Gaumer* 311, also without number in 1888. *Millspaugh* 188. Kancabconot, *Gaumer* 23783. Merida, *Schott* 24; *Valdez* 68. San Anselmo, *Gaumer* 1627. Without special locality, *Seler* 3973.

BRITISH HONDURAS: El Cayo, *Bartlett* 11497.

13. HENRYA Nees.

1. HENRYA SP.

The genus *Henrya* is represented in the Yucatan Peninsula by a single species, specimens of which have usually been determined as *Tetramerium scorpioides* (L.) Hemsl. or *Henrya costatum* Gray. Recent work on this genus by Mr. George B. Happ indicates that this material represents a new species, which will shortly be described. It is common in dry rocky brushlands.

YUCATAN: Calotmul, *Gaumer* 1713. Colonia San Casme, *Greenman* 350. Izamal, *Gaumer* 368; *Millspaugh* 65; *Seler* 3922. Silam, *Gaumer* 1712. Without special locality, *Goldman* 590.

14. TETRAMERIUM Nees.

1. TETRAMERIUM HISPIDUM Nees in DC. Prodr. 11: 468. 1847.

Herb up to 30 cm. high; stems terete, branched, brittle, pilosulous or glabrate; leaf blades ovate, 1 to 2.5 cm. long, 0.5 to 1.2 cm. wide, obtuse at apex, rounded at base, pilosulous, entire; petiole up to 8 mm. long, slender, pilose; flowers borne in terminal spikes up to 9 cm. long and about 8 mm. in diameter, the rachis glabrous or sparingly pilose; bracts elliptic, about 7 mm. long and 4 mm. wide, acute, ending in a spine 0.5 mm. long, ciliate, 3-nerved, closely imbricate; bractlets narrowly lance-aristate, 2.5 mm. long, 0.5 mm. wide, the tip pilose; calyx segments similar to the bractlets but slightly longer; corolla 1 cm. long, white, glabrous, the tube slender, the lips 5 mm. long, the upper entire, the lower 3-lobed, the lobes elliptic, 3 mm. long; an-

ther lobes parallel, slightly unequal, about 1 mm. long; capsule 4.5 mm. long, pubescent or glabrate; seeds papillose.—Dry open ground, continental tropical America.

YUCATAN: Calotmul, *Gaumer* 2342. Chal-tun-ha, *Millspaugh* 78. Chichen Itza, *Steere* 1219. Izamal, *Gaumer* 398. Kancabconot, *Gaumer* 23592. Merida, *Valdez* 70. Pocoboch, *Gaumer* 2341. Progreso, *Steere* 3036.

15. PSEUDERANTHEMUM Radlk.

Herbs or small shrubs; leaves opposite, usually ovate; flowers borne in terminal or axillary bracteate spikes, the bracts and bractlets small; calyx segments 4 or 5, subulate; corolla white, blue, or pink, the tube slender, the limb spreading, the 5 lobes subequal; stamens 2, included; staminodes 2; anther cells 2, muticous or acute at base; capsule oblong, long-stipitate; seeds 2 or 4.

Flowers crowded, the spikes short; stems corky below.....1. *P. nanum*

Flowers distant, the spikes slender; stems not corky.

Calyx 4-lobed2. *P. tetrasepalum*

Calyx 5-lobed.

Leaf blades thin, cordate to truncate at base; petioles conspicuously winged3. *P. alatum*

Leaf blades subcoriaceous, narrowed at base; petioles not conspicuously winged4. *P. adenocarpum*

1. PSEUDERANTHEMUM NANUM Standl. Field Mus. Bot. 8: 46. 1930.

Perennial herb 5 to 17 cm. high; stem simple or sparingly branched, white-corky below, puberulent above, the internodes short; leaf blades ovate to ovate-elliptic, 2 to 5 cm. long, 1 to 2.5 cm. wide, obtuse or rounded at apex, narrowed at base, coriaceous, entire, shining, green above (the costa and veins said to be whitish in the living plant), pale beneath, the margin incrassate; spikes terminal, sessile or short-pedunculate, single or in pairs, 2 to 5 cm. long, densely flowered; bracts subulate, about 6 mm. long, rigid, erect, puberulent, imbricate; calyx segments 9 mm. long, subulate-attenuate, rigid, erect, minutely puberulent; corolla 1.5 to 2 cm. long, glabrous, the tube slender, about 8 mm. long, the lobes subequal, obtuse or rounded at tip; capsule glabrous.

YUCATAN: Silam, *Gaumer* 1305 (type). Progreso, *Gaumer* 2295.

2. PSEUDERANTHEMUM TETRASEPALUM (Blake) Blake, Proc. Biol. Soc. Wash. 34: 200. 1923.

Eranthemum tetrasepalum Blake, Contr. Gray Herb. n. ser. 52: 99. 1917.

Plant 1 to 1.6 meters high; stem branched, hispidulous-pilose, the hairs crowded in two rows; leaf blades ovate or ovate-oval, 7.5 to 10.5 cm. long, 3.3 to 4.7 cm. wide, subfalcate, acuminate, rounded to cuneate at base, crenate-sinuate, glabrous; spikes both terminal and axillary, 8.7 to 12.5 cm. long, the rachis hispidulous (hairs in two lines), nodes 5 to 7 mm. distant; flowers solitary, opposite; bracts linear-subulate, 2.5 mm. long; calyx segments 4, linear-subulate, up to 5 mm. long; corolla 2.4 cm. long, tube very slender, the two upper lobes 8 mm. long and 3 mm. wide, the 3 lower ones 7 mm. long and 3 mm. wide; capsule 8.5 to 10 mm. long, stipitate, glabrous, 4-seeded.—In forests, British Honduras.

BRITISH HONDURAS: Moho River, *Peck* 552 (type).

3. *PSEUDERANTHEMUM ALATUM* (Nees) Radlk. in Sitzb. Math.-phys. Cl. Akad. Wiss. Muench. 13: 286. 1883.

Eranthemum alatum Nees in DC. Prodr. 11: 450. 1847.

Herbs, up to 50 cm. high; stems rather sparingly hirtellous; leaf blades ovate, up to 15 cm. long and 12 cm. wide, short-acuminate, cordate or occasionally truncate at base, thin, glabrous or sparingly hirtellous, the veins 6 to 8 on each side; petiole winged, gradually enlarged from base to 5 mm. broad at base of leaf blade, the margin of the wings entire or sinuate-dentate; spikes terminal, simple or sparingly branched, the peduncles bearing one or two pairs of ovate or orbicular, sessile, leaflike bracts; flowers solitary or borne in fascicles, the internodes 5 to 20 mm. long, the rachis and pedicels glabrous or sparingly hirtellous; bractlets triangular, 0.5 mm. long; pedicels 0.5 mm. long; calyx about 2 mm. long, the segments lance-subulate, glabrous or sparingly hirtellous; corolla blue, 2 to 3 cm. long, glabrous, the tube very slender, 1 mm. in diameter, the limb about 2 cm. wide, the segments oblong, subequal, rounded at tip, finely nerved; stamens 2.5 mm. long, inserted in throat; staminodes 0.5 long; capsule 1 cm. long, glabrous, slenderly stipitate, 4-seeded, the seeds roughened.—In woods, southern Mexico and Guatemala.

CAMPECHE: Conhuas to Chan Laguna, *Lundell* 1055.

GUATEMALA, DEPT. PETÉN: Uaxactun, *Bartlett* 12305.

4. *PSEUDERANTHEMUM ADENOCARPUM* (Blake) Blake, Proc. Biol. Soc. Wash. 34: 200. 1923.

Eranthemum adenocarpum Blake, Contr. Gray Herb. n. ser. 52: 98. 1917.

A perennial herb; stems erect, simple or sparingly branched, hispidulous-pilose, the hairs crowded in two rows; leaf blades lanceolate or oval, sometimes subfalcate, 3 to 7 cm. long, 1 to 3 cm. wide, acuminate or acute at apex (the tip blunt), narrowed at base, subcoriaceous, glabrous, sinuate; petioles 3 to 5 mm. long; spikes terminal and axillary, 5 to 9 cm. long, pilose or glabrate, the internodes 5 to 15 mm. long; flowers solitary, opposite; bractlets subulate, 2 to 3 mm. long; calyx segments subequal, subulate, 2.5 mm. long, glabrous; corolla blue or pink, 2 to 2.7 cm. long, the tube very slender, the two upper lobes 9 mm. long and 5.5 mm. wide, the three lower ones 8 mm. long and 4 mm. wide; staminodes 1 mm. long; capsule 1.4 cm. long, clavate, sparingly puberulent, 4-seeded.—Usually in shaded places, British Honduras.

BRITISH HONDURAS: Machaca, *Schipp* 462. Ocotal, *Schipp* 671. Pueblo Viejo, *Schipp* 669. Toledo, *Peck* 830 (type).

16. *ODONTONEMA* Nees

Herbs or shrubs; leaves usually large, opposite and entire; flowers in narrow terminal panicles; calyx 5 parted, the segments small and narrow; corolla white, red, or yellow, the tube slender, the throat only slightly enlarged, the limb 2-lipped, nearly regular; stamens 2, the anther sacs blunt at base; staminodes 2; capsule oblong, stipitate; seeds 4 or fewer.

Rachis subtomentose.

Corolla pink or red, 2 to 3 cm. long; leaves thin.....1. *O. callistachyum*

Corolla white, up to 1.4 cm. long; leaves coriaceous.....2. *O. albiflorum*

Rachis glabrous or sparingly puberulent.

Corolla red3. *O. strictum*

Corolla yellow.

- Flowers solitary or borne in pairs; rachis trichotomously divided; pedicels slender, up to 1 cm. long.....4. *O. paniculiferum*
 Flowers fascicled; rachis simple or with a few short branches at base; pedicels usually very short.....5. *O. glabrum*

1. *ODONTONEMA CALLISTACHYUM* (Schlecht. & Cham.) Kuntze, Rev. Gen. Pl. 2: 494. 1891.

Justicia callistachya Schlecht. & Cham. Linnæa 6: 370. 1831.

Thyrsacanthus callistachyus Nees in DC. Prodr. 11: 326. 1847.

Thyrsacanthus lilacinus Lindl. Journ. Hort. Soc. Lond. 6: 159. 1851.

Plants suffrutescent, 2 to 4.5 meters high; leaves lance-oblong to elliptic-ovate, 10 to 30 cm. long, acuminate, the upper sessile, the lower petiolate; inflorescence a dense interrupted racemiform or paniculate thyrse, the flowers borne in fascicles, these subtended by triangular cuspidate bracts about 4 mm. long, the rachis and pedicels subtomentose; calyx segments subulate, about 2 mm. long, ciliolate; corolla pink or red, glabrous, 2 to 3 cm. long, 5 mm. broad at throat, the lips 4 to 5 mm. long, the upper ones 2-lobed (lobes about 3 mm. long), the lower 3-lobed nearly to base, the lobes all rounded and ciliolate near tip; filaments 4 to 13 mm. long, the staminodes attached to base of filaments, 0.5 to 1 mm. long; capsule 2 cm. long, narrow and solid from middle to base, glabrous, 4-seeded.—Thickets, southern Mexico and Central America.

BRITISH HONDURAS: El Cayo, *Bartlett* 11952; *Chanek* 41. Manatee Lagoon, *Peck* 394. Gracie Rock, Sibun River, *Gentle* 1538. Stann Creek, *Schipp* 146.

GUATEMALA, DEPT. PETÉN: Laguna Perdida, *Lundell* 1646. Santa Cruz, *Bartlett* 12389. Uaxactun, *Bartlett* 12156.

2. *Odontonema albiflorum* Leonard, sp. nov.

FIG. 14.

Suffrutescens, caulibus puberulentis vel glabrescentibus; folia oblongo-elliptica, apice acuminata, basi sensim in petiolum angustata, integra, glabra; thyrsus terminalis angustus; bracteae triangulares, acuminatae, minutae; calycis laciniae subulatae, minutae; corolla alba, glabra, labio superiore bilobo, inferiore trilobo, lobis oblongis apice rotundatis, ciliatis.

Suffrutescent, up to 2 meters high; stem puberulent or glabrate; leaf blades oblong-elliptic, up to 30 cm. long and 12 cm. wide, acuminate, the tip usually curved, narrowed at base to a stout short petiole 5 to 10 mm. long, the narrowed basal portion often rounded just above petiole, coriaceous, entire or undulate, both surfaces glabrous or the costa bearing a few minute hairs, the upper surface minutely alveolate; flowers crowded in one or two narrow spikelike terminal thyrses, these simple or rarely branched at base, the rachis rather sparingly subtomentose, the fascicles of 6 or more crowded flowers opposite and contiguous; bracts subtending the fascicles triangular, 3 to 4 mm. long, 2 mm. wide at base, acuminate and awn-tipped, the bracts subtending the flowers similar but somewhat smaller, all ciliolate; pedicels (at least those of the lower flowers) up to 2 mm. long, pilosulous; calyx 3.5 mm. long, the segments subulate, 0.5 mm. wide at base, ciliolate; corolla about 14 mm. long, white, glabrous, the lips about 6 mm. long, the upper 2-lobed (the lobes oblong, 3 mm. long), the lower lip 3-lobed nearly to its base, all the lobes about 2 mm. wide, rounded and ciliolate at tip; filaments about 6 mm. long, glabrous; anthers 2 mm. long, one lobe attached

slightly higher than the other; staminodes 1.5 mm. long, united with filament of stamen at base; style about 12 mm. long, pilosulous; capsule about 2 cm. long, usually 2-seeded, the narrow solid basal portion about 1 cm. long; retinacula 3 mm. long, blunt or obtuse at apex.

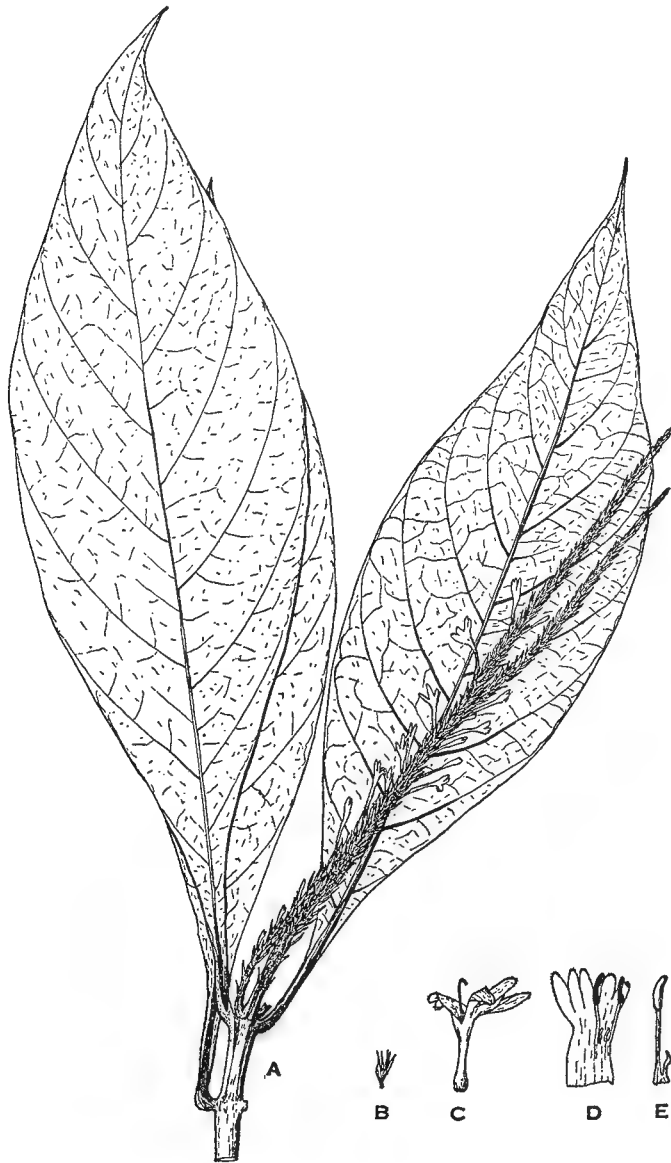


FIG. 14—*Odontonema albiflorum* Leonard, sp. nov. A, plant, half nat. size; B, calyx; C, corolla; D, corolla spread to show stamens; E, stamen and staminode. (B, C, D, nat. size; E, twice nat. size.)

Type in the U. S. National Herbarium No. 1,320,563, collected at Cubilquitz, Department Alta Verapaz, Guatemala, February 1901, by H. von Tuerckheim (No. 7937).

Inasmuch as this species is new, all material is cited.

BRITISH HONDURAS: Mullins River Road, *Schipp* 278. San Antonio, *Bartlett* 13065. Toledo, *Peck* 786, 787.

GUATEMALA: Cubilquitz, *Tuerckheim* 286. Lago Izabal, *Johnson* 308. Baja Verapaz, *Pittier* 152; *Tuerckheim* 1752. Rio Pasion, *Aguilar* 510. St. Thomas, *Deam* 6057. Secanquim, *Pittier* 185. Secanquim to Sepacuite, *Cook & Griggs* 371. Secanquim to Setzapec, *Goll* 101. Izabal, *Donnell Smith* 1806.

HONDURAS: Hacienda El Limon to El Paraiso, *Blake* 7353.

These specimens have been variously determined as *O. callistachyum*, *O. strictum*, *O. geminatum*, or *O. cuspidatum*, all of which, however, have red flowers. The corollas of the present species are not only white but remarkably small for the genus, resembling those of *O. hookerianum* from Peru. *O. albiflorum* is further marked by its firm veiny leaves, in which the upper surfaces are lustrous and minutely alveolate.

3. ODONTONEMA STRICTUM (Nees) Kuntze, Rev. Gen. 2: 494. 1891.

Thysacanthus strictus Nees in DC. Prodr. 11: 324. 1847.

Suffrutescent, about 1 meter high, glabrous; leaves up to 20 cm. long and 6 cm. wide, acuminate, narrowed at base to a short petiole, entire; inflorescence a branched raceme up to 30 cm. long or more, the rachis minutely and sparingly puberulent; flowers borne in pseudowhorls, the pedicels short, subtended by a keeled, acuminate outer bract (1 mm. wide at base) and several minute subulate inner bracts; calyx 3 mm. long, the segments subulate, purplish-red; corolla rich scarlet, tubular or slightly funnel-shaped, the lips about 6 mm. long, the upper 2-lobed at tip, the lower 3-lobed nearly to base, the lobes ovate, obtuse, minutely ciliolate; fertile stamens reaching notch of upper lip; staminodes about 0.5 mm. long, subulate; style shorter than the corolla tube.—Forests of Central America.

BRITISH HONDURAS: Cornejo Creek, Temash River, *Kinloch* 33.

4. ODONTONEMA PANICULIFERUM Blake, Contr. Gray Herb. n. ser. 52: 104. 1917.

A weak shrub up to 2 meters high; stem glabrous; leaf blades elliptic, 12 to 14 cm. long, 2 to 5 cm. wide, acuminate at apex, narrowed at base, entire or sinuose, glabrous, or the costa of the lower surface sparingly strigose, the cystoliths inconspicuous; petioles 5 to 6 mm. long; flowers in weak terminal trichotomously divided panicles up to 7 cm. long, glabrous or sparingly and minutely puberulent; bracts subulate, up to 1.5 mm. long; flowers solitary or occasionally fascicled, the pedicels spreading or ascending, up to 6 mm. long; calyx segments linear-subulate, 2 mm. long, sparingly ciliolate; corolla yellow, infundibular, about 2 cm. long, subglabrous, obscurely 2-lipped, the upper lip 2-lobed to base, the lower one 3-parted, its lobes deltoid-oval, obtuse, ciliolate; anthers 2 mm. long, muticous at base, the filaments 4 mm. long, glabrous; staminodes free from filaments, 0.5 mm. long; capsule clavate, glabrous 2- to 4-seeded; seeds densely reticulate-scribulate.—Forests of British Honduras.

BRITISH HONDURAS: El Cayo, *Bartlett* 11442. Manatee Lagoon, *Peck* 278 (type). Caves, Stann Creek Railway, *Schipp* 222.

5. ODONTONEMA GLABRUM T. S. Brandeg. Univ. Calif. Pub. Bot. 6: 195. 1915.

Suffrutescent, glabrous throughout, about 1 meter high; leaf blades oblong-elliptic, up to 20 cm. long and 7 cm. wide, acuminate at apex, narrowed at base to a short petiole, entire; inflorescence a simple or branched terminal panicle; flowers fascicled, subtended by small triangular bracts; calyx segments narrowly lanceolate, about 2 mm. long; corolla yellow, about 2 cm. long, upper lip 2-lobed nearly to middle, the lower 3-lobed nearly to base, all the lobes ovate, obtuse; stamens about as long as corolla; staminodes 0.5 to 1 mm. long; capsule about 2 cm. long, glabrous.—Southern Mexico and northern Central America.

BRITISH HONDURAS: El Cayo, *Bartlett* 12947.

17. DICLIPTERA Juss.

Herbs; leaves entire, usually ovate, petioled; inflorescence spicate, cymose, or paniculate, the flowers 1 to several, subtended by an involucre of 2 to 4 bracts, often forming short contracted cymes; calyx 5-parted, hyaline; corolla narrow, slightly ampliate, the limb 2-lipped; stamens 2, the anther sacs often unequal, the longer one sometimes calcarate at base; capsules ovate or suborbicular, the placentæ separating elastically from the walls; seeds 2 or 4.

Flowers borne in interrupted spikes.....1. *D. assurgens*
Flowers borne in verticillasters.....2. *D. acuminata*

1. DICLIPTERA ASSURGENS (L.) Juss. Ann. Mus. Paris 9: 269. 1807.

Justicia assurgens L. Syst. ed. 10, 850. 1759.

Dicliptera portoricensis Spreng.; Schult. Mant. 1: 149. 1822.

Diapedium assurgens Kuntze, Rev. Gen. Pl. 2: 485. 1891.

An herb up to 1.5 meters long; stems ascending, simple or branched, glabrous or somewhat puberulent; leaf blades (often deciduous at an early stage) ovate to oblong-lanceolate, 4 to 10 cm. long, up to 6 cm. wide, acute or obtuse at apex, narrowed at base; petioles slender; flowers borne in small bracted clusters, in slender interrupted, simple or branched spikes 5 to 15 cm. long; bracts lanceolate or spatulate, 8 to 15 mm. long; calyx about 4 mm. long, the segments linear-lanceolate, equaling the tube or longer; corolla scarlet or red, 2 to 2.5 cm. long, the tube curved, the lips lanceolate; capsules 5 to 6 mm. long.—Open hillsides; Florida, West Indies, and tropical continental America.

YUCATAN: Calotmul, *Gaumer* 1308, 1760. Chichankanab, *Gaumer* 1759, 23646. Chichen Itza, *Goldman* 560. Colonia San Cosme, *Greenman* 362. Cozumel, *Millspaugh* 1521, 1692. Isamal, *Gaumer* 413. Kancabconot, *Gaumer* 23572. Merida, *Schott* 154; *Seler* 3854, 3854a. Progreso, *Gaumer* 2298; *Millspaugh* 1711; *Seler* 3816. San Anselmo, *Gaumer* 1757. Temax, *Gaumer* 1758. Without definite locality, *Gaumer* 24152; *Valdez* 33.

BRITISH HONDURAS: Freshwater Creek Reserve, *Pelly* 24. Little Cocquericot, *Lundell* 4102, 4103. Manatee Lagoon, *Peck* 351. Maskall, *Gentle* 1119. Sunny Land, *Lundell* 4101.

2. DICLIPTERA ACUMINATA (Ruiz & Pav.) Juss. Ann. Mus. Paris 9: 268. 1807.

Dianthera acuminata Ruiz & Pav. Fl. Peruv. 1: 10. pl. 16, fig. b. 1798.

Justicia acuminata Vahl, Enum. 1: 151. 1804.

Diapedium acuminatum Kuntze, Rev. Gen. Pl. 2: 485. 1891.

Herb up to 1 meter high; stems erect, branched, hirsute or glabrate; leaf blades oblong-lanceolate to ovate-lanceolate, 5 to 10 cm. long, 2 to 4 cm.

wide, acuminate at apex, narrowed at base, entire, sparingly pubescent or glabrate; petioles slender; flowers borne in verticillasters, each cyme (peduncles up to 2.5 cm. long) composed of 1 to 6 flower clusters of 2 flowers each, the clusters subtended by a pair of lance-subulate bracts 4 to 5 mm. long, and each flower subtended by 3 or 4 pairs of bracts, the outer pair linear-oblong, about 13 mm. long, obtusish, the middle pair about 8 mm. long, acuminate, the inner ones narrowly lanceolate, all ciliate; calyx segments 5, subequal, 3 to 4 mm. long, subulate; corolla pink, about three times as long as the subtending bracts, 2-lipped, the upper lip lanceolate, entire, the lower tridentate; capsule obovate.—Forests; Central America to northern South America.

BRITISH HONDURAS: Camp 31, B. H. G. Survey, *Schipp* 684.

18. JACOBINIA Moric.

Herbs or shrubs; leaves usually oblong or ovate, entire, petioled; flowers sessile or short-pedicellate in the axils of bracts, solitary, cymose, spicate, or paniculate; calyx 5-parted, the segments narrow; corolla usually red or yellow, the tube usually slender and elongate, straight or curved, the limb 2-lipped, the upper lip narrow, erect, entire or shallowly 2-lobed, the lower lip 3-lobed; stamens 2, the anther cells more or less unequal, muticous; ovules 2 in each cell.

Flowers borne in a large dense terminal thyrse.....1. *J. umbrosa*

Flowers borne in terminal or axillary cymes or spikes.

Corolla glabrous2. *J. spicigera*

Corolla pubescent.

Leaf blades oblong-lanceolate, glabrous, about 20 cm. long; corolla

orange-yellow, 6.5 cm. long.....3. *J. ensiflora*

Leaf blades elliptic, pilosulous, 2 to 4.5 cm. long; corolla white,

about 1 cm. long.....4. *J. leucothamna*

1. JACOBINIA UMBROSA (Benth.) Blake, Contr. Gray Herb. n. ser. 52: 103. 1917.

Justicia aurea Schlecht. Linnæa 7: 393. 1832.

Justicia umbrosa Benth. Pl. Hartw. 79. 1841.

Cyrtanthera catalpæfolia Nees in Curtis' Bot. Mag. 75: pl. 4444. 1849.

Cyrtanthera chrysostephana Hook. f. in Curtis' Bot. Mag. 97: pl. 5887. 1871.

Jacobinia aurea Hemsl. Diag. Pl. Mex. 35. 1879. Not *J. aurea* Hiern, 1877-78.

A shrub or small tree up to 4 meters high or more; branches puberulent or glabrous; leaf blades lance-oblong to broadly ovate, 10 to 45 cm. long, up to 12 cm. wide or more, acute or acuminate at apex, abruptly decurrent at base, glabrous or puberulent; petioles 5 to 8 cm. long; inflorescence a many-flowered thyrse 7 to 30 cm. long, the rachises puberulent; bracts linear-lanceolate, 1 to 2 cm. long, about 2 mm. wide, one-nerved, puberulent; calyx segments 5, lanceolate, 7 mm. long, 1.5 mm. wide, puberulent, 3-nerved; corolla 4.5 to 5 cm. long, yellow, puberulent or pilosulous, the lips 2.5 cm. long, the upper narrow, erect, entire, the lower 3-lobed, the lobes 2 mm. long, rounded; anthers 3 mm. long, the cells slightly unequal, minutely and abruptly acute at base.—Damp woods; southern Mexico, and Central America.

BRITISH HONDURAS: El Cayo, *Bartlett* 12937. Rio Grande, *Schipp* 601.

GUATEMALA, DEPT. PETÉN: La Libertad, *Lundell* 2864.

2. *JACOBINIA SPICIGERA* (Schlecht.) L. H. Bailey, Stand. Cycl. Hort. 1715. 1915.

Justicia spicigera Schlecht. Linnæa 7: 395. 1832.

Justicia atramentaria Benth. Pl. Hartw. 69. 1840.

Drejera willdenowiana Nees in DC. Prodr. 11: 334. 1847.

Sericographis mohinili Nees in DC. Prodr. 11: 361. 1847.

Jacobinia mohintli Hemsl. Biol. Centr. Amer. Bot. 2: 521. 1882.

Jacobinia scarlatina Blake, Contr. Gray Herb. n. ser. 52: 102. 1917.

An erect shrub 1 to 1.5 meters high or, if scandent, up to 5 meters long, the branches pubescent in 2 lines (the hairs curved) or glabrate; leaf blades lance-oblong to ovate, 6 to 17 cm. long, 3 to 7 cm. wide or more, acute to acuminate (the tip blunt), narrowed or rounded at base and decurrent on petiole, glabrous, or the costa and veins of the upper surface pubescent; flowers secund, borne in axillary or terminal cymes; bracts triangular, about 1.5 mm. long; calyx segments lanceolate, 3 mm. long; corolla 3 to 3.5 cm. long, red or orange, glabrous, the lips about 1.5 cm. long, the upper straight, narrow, entire, the lower 3-lobed, the lobes rounded, 2 to 3 mm. long; anthers 3.5 mm. long, the cells acute at base.—Dry thickets; southern Mexico and Central America. Crushed leaves are often used instead of bluing, in laundering clothes.

YUCATAN: Fiscal, *Schott* 635. Izamal, *Gaumer* in 1888. Without special locality, *Gaumer* 24178, 24326.

BRITISH HONDURAS: Cockscorn Mountains, *Schipp* 523. El Cayo, *Chanek* 40. Manatee Lagoon, *Peck* 430 (type of *J. scarlatina*). Orange Walk District, *Winzerling* VIII 10.

GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1549. La Libertad, *Lundell* 2415.

3. *JACOBINIA ENSIFLORA* Standl. Field Mus. Bot. 8: 45. 1930.

Suffrutescent, 1 meter high or more; stem glabrous below, puberulent toward tip; leaf blades oblong-lanceolate, about 20 cm. long, 5 to 5.5 cm. wide, acuminate at both ends, entire or undulate, glabrous; petioles 1.8 to 3.5 cm. long; flowers numerous, borne in terminal paniculate cymes, the peduncles up to 16 cm. long, the cymes up to 10 cm. long, the branches of the inflorescence densely and minutely pilose, some of the hairs glandular; bracts oblong, 4 to 5 mm. long, glandular-pilosulous; calyx segments linear, about 8 mm. long, glandular-pilosulous; corolla about 6.5 cm. long, glandular-villosulous, orange-yellow, the lips about 3 cm. long, the upper 2-lobed at tip, the lobes rounded, about 0.5 mm. long, the lower 3-lobed, the lobes linear, about 4 mm. long; anthers linear-oblong, 5 mm. long.—Damp forests; British Honduras.

BRITISH HONDURAS: Middlesex, *Schipp* 354 (type).

4. *JACOBINIA LEUCOTHAMNA* Standl. Field Mus. Bot. 8: 44. 1930.

Shrub up to 2 meters high; branches terete, yellowish or white, glabrous, puberulent, or pilosulous; leaf blades elliptic to oblong-elliptic, 2 to 4.5 cm. long, 1.5 to 3.5 cm. wide, rounded and apiculate or merely obtuse at apex, rounded or obtuse at base, both surfaces pilosulous or glabrate; petiole 2 to 4 mm. long; flowers borne in simple or branched axillary spikes 1 to 2 cm. long, the rachis pilosulous; bracts subulate, 1.5 mm. long, hispidulous;

calyx segments lance-subulate, 2.5 mm. long; corolla 8 to 9 mm. long, pilose, white; anthers 1 mm. long, the lobes obtuse at base.—Yucatan.

YUCATAN: Silam, *Gaumer* 1242 (type), 2280.

19. DREJERELLA Lindau

1. DREJERELLA LONGIPES Standl. Field Mus. Bot. 8: 47. 1930.

An erect branched herb up to 30 cm. high; stems terete, densely pilosulous, some of the hairs glandular; leaf blades rotund-ovate, 7 to 17 mm. long, 8 to 14 mm. wide, acute to subobtuse at apex, rounded at base, thin, entire, 3-nerved at base, both surfaces glandular-pilosulous; petiole slender, 1 to 2.2 cm. long, viscid-pilosulous; flowers borne in dense bracted spikes 1 to 2 cm. long, the bracts similar to the leaves but smaller (5 mm. long); calyx segments 5, linear-subulate, 4 mm. long, densely pilose; corolla white, glabrous, 11 to 14 mm. long, the tube slender, 6 to 7 mm. long, the upper lip obovate, 6 mm. long, shallowly emarginate, the lower lip 3-lobed, each lobe similar to the upper lip; stamens about as long as corolla segments, the anther lobes 1 to 1.5 mm. long, slightly unequal; capsule 4 mm. long, glabrous, usually 2-seeded; seeds papillose.—Yucatan.

YUCATAN: Buena Vista, *Gaumer* in 1899. Chichen Itza, *Millspaugh* 1621 (type).

20. JUSTICIA L.

Herbs or shrubs; leaves petiolate, usually ovate, entire; flowers spicate, paniculate, or solitary; bracts small, or occasionally large and imbricate; calyx segments narrow, nearly equal; corolla usually white, purple, or pink, sometimes light purple or white with dark purple markings, the tube longer or shorter than the limb, the throat ampliate, the upper lip 2-lobed, the lower 3-lobed; stamens 2; anther cells 2, unequally attached, acute or calcarate; ovules 2 in each cavity; capsule oblong to obovate.

Calyx segments 5.

Corolla large, 3 cm. long..... 1. *J. carthaginensis*

Corolla small, 1 cm. long or less.

Inflorescence eglandular.

Bracts subulate, not imbricate..... 2. *J. campechiana*

Bracts orbicular, imbricate..... 3. *J. lundellii*

Inflorescence more or less glandular-pubescent.

Leaf blades ovate..... 4. *J. myriantha*

Leaf blades lanceolate to oblong.

Inflorescence terminal; corolla 8 to 10 mm. long..... 5. *J. pectoralis*

Inflorescence axillary; corolla 3 to 6 mm. long..... 6. *J. comata*

Calyx segments 4.

Flowers sessile in the axils of the upper leaves; leaf blades ovate to elliptic, 3.5 cm. long or less..... 7. *J. sessilis*

Flowers in terminal or axillary spikes; leaf blades oblong-ovate to lanceolate, 4 to 14 cm. long.

Bracts ovate, large, white or whitish..... 8. *J. albobractea*

Bracts subulate, small, green.

Corolla 15 mm. long, glabrous..... 9. *J. peckii*

Corolla 10 mm. long, finely pubescent..... 10. *J. breviflora*

1. JUSTICIA CARTHAGINENSIS Jacq. Enum. 11. 1760.

Adhatoda carthagenensis Nees in DC. Prodr. 11: 403. 1847.

Herbaceous or suffrutescent, up to 1.5 meters high; stems erect, branched, pilosulous in two lines or glabrous; leaf blades ovate or elliptic-ovate, 5 to

12 cm. long, acuminate at apex, narrowed or rounded at base and decurrent on the petioles, glabrous or pilosulous; petioles 0.5 to 2 cm. long; flowers borne in dense terminal bracted spikes 3 to 7 cm. long; bracts oblong, 15 mm. long or less, about 5 mm. wide, acute to obtuse, the bractlets similar but narrower, all pilosulous, some of the hairs glandular; calyx segments 5, linear-lanceolate, 10 to 11 mm. long, white margined, ciliate toward tip; corolla purple, about 3 cm. long, sparingly glandular-pubescent, the tube about 1.5 cm. long, the upper lip straight, about as long as the tube, notched at apex, the lower lip spreading, slightly longer than the upper, 3-lobed, the lobes elliptic, about 1 cm. long, rounded; capsule 1.5 to 2 cm. long, finely puberulent.—Forests, slopes and waste places; West Indies and tropical continental America.

YUCATAN: Bocas de Silam, *Gaumer* 24352. Buena Vista, *Gaumer* 784. Chichankanab, *Gaumer* 1958, 1959. Chichen Itza, *Steere* 1223, 1379, 1429; *Swallen* 2472. Progreso, *Gaumer* 23156; *Seler* 3813; *Steere* 3013. San Anselmo, *Gaumer* 1957. Without definite locality, *Gaumer* 24392.

2. *JUSTICIA CAMPECHIANA* Standl. Carnegie Inst. Wash. Pub. No. 461: 88. 1935. FIG. 15.

Suffrutescent; stem branched, glabrous or pubescent in 2 lines; leaf blades oblong, up to 9 cm. long and 3 cm. wide, acuminate to acute at apex, cuneate at base, glabrous, the cystoliths numerous and prominent; petioles slender, up to 2 cm. long; spikes terminal or axillary, simple or branched, one to several in each axis, short-peduncled, the rachis pubescent in 2 lines, the flowers approximate; bracts subulate, 2 to 2.5 mm. long, keeled, ciliate; calyx segments lanceolate, about 6 mm. long, 1 mm. wide, 1-nerved, glabrous, corolla 9 to 10 mm. long, pubescent, white with pale reddish-purple markings on lower lip, the lips about 6 mm. long, the upper 2-lobed, the lower irregularly 3-lobed, the lobes barely 1 mm. long, rounded; capsule not seen.—A frequent weed; Campeche and British Honduras.

CAMPECHE: Monterrey, *Lundell* 1126 (type).

BRITISH HONDURAS: Freshwater Creek Reserve, *Pelly* 3.

3. *Justicia lundellii* Leonard, sp. nov. FIG. 16.

Herba siccitate nigrescens, caule bifariam pubescente; folia ovata, parva, apice obtusa, basi angustata, minute pilosa; spicæ breves, subcapitatæ, terminales; bracteæ suborbiculares, imbricatæ, minute pilosæ, ciliatæ; bracteolæ lanceolatæ; calycis laciniae lineari-lanceolatæ, ciliatæ; corolla purpurea, pubescens, lãbio superiore bilobo, inferiore trilobo.

A weedy herb, drying black; stem erect or decumbent, pubescent in 2 lines, the hairs retrorsely curved; leaf blades ovate, 1 to 4 cm. long, 0.5 to 2 cm. wide, obtuse at apex, narrowed at base, sparingly pilosulous, the hairs confined chiefly to costa and veins; petioles slender, up to 1 cm. long; flowers borne in short terminal subcapitate spikes 1 to 2 cm. long and about 1 cm. in diameter, the peduncles up to 7 mm. long, pubescent; bracts suborbicular, about 5 mm. in diameter, rounded, narrowed at base, minutely pilosulous, ciliate, closely imbricate; bractlets lanceolate, 4 mm. long, 1.5 mm. wide, otherwise similar to the bracts; calyx segments 5, linear-lanceolate, 2.5 mm. long, ciliate; corolla 7.5 mm. long, pubescent, purplish, the lips 3 mm. long, the upper 2-lobed, the lower 3-lobed; anther cells unequally attached, acute at base; ovary glabrous.

Type in the U. S. National Herbarium, No. 1,494,536, collected at Tuxpeña, Campeche, Mexico, Nov. 12, 1931, by C. L. Lundell (No. 935).

Readily distinguished from other species in the Yucatan Peninsula by its small compact subcapitate spikes and orbicular bracts and by the black coloration of dried plants.



FIG. 15—*Justicia campechiana* Standl. A, plant, half nat. size; B, fragment of inflorescence showing corolla, nat. size; C, upper lip of corolla; D, lower lip of corolla; E, stamen. (C, D, E, twice nat. size.)

4. *JUSTICIA MYRIANTHA* Standl. Field Mus. Bot. 8: 45. 1930.

An herb up to 35 cm. long; stems erect or decumbent, terete, striate, pubescent in 2 lines, the hairs curved; leaf blades rotund to elliptic-ovate, 1.5 to 4 cm. long, 1 to 3 cm. wide, obtuse to acutish at apex, rounded or obtuse at base, entire, ciliate, the costa and nerves pubescent, both surfaces densely covered with cystoliths; petiole 0.8 to 2.5 cm. long; flowers borne in slender rigid, interrupted spikes usually 5 to 13 cm. long, these forming terminal

panicles or axillary fascicles, the rachises glandular-pilosulous; bracts rigid, subulate, about 2 mm. long; calyx segments linear-subulate, 2.5 to 3 mm. long, erect, glandular-puberulent; corolla about 5 mm. long, glabrous, the lobes obovate, obtuse or rounded, about as long as tube; capsule 4 to 5 mm.



FIG. 16—*Justicia lundellii* Leonard, sp. nov. A, plant, half nat. size; B, bracts and bractlets; C, calyx spread to show segments; D, corolla; E, upper lip of corolla showing attachment of stamen; F, lower lip of corolla; G, stamen. (B, C, D, E, F, nat. size; G, twice nat. size.)

long, glabrous, slenderly stipitate; seeds minutely tuberculate.—Moist soil; Yucatan.

YUCATAN: Buena Vista Xbac, Gaumer 1102. Chichankanab, Gaumer 23718, 23742. Kancabconot, Gaumer 23557 (type).

5. *JUSTICIA PECTORALIS* Jacq. Enum. 11. 1760.*Dianthera pectoralis* Gmel. Syst. Nat. 2: 36. 1791.*Rhytiglossa pectoralis* Nees in Mart. Fl. Bras. 9: 128. 1847.

An herb up to 60 cm. long; stems erect, decumbent or ascending, sparingly branched, commonly rooting at the lower nodes, short-pilose in two lines below, finely puberulent and more or less glandular above; leaf blades lanceolate to ovate-lanceolate, 3 to 10 cm. long, acuminate, narrowed or obtuse at base, glabrous; petioles 2 to 12 mm. long; inflorescence a terminal few- or several-branched panicle, the branches slender, alternate, 2 to 12 cm. long, the flowers subdistant; bracts and bractlets setaceous; calyx segments subulate, about 2 mm. long; corolla pink, puberulent, 8 to 10 mm. long, the tube 5 mm. long, the upper lip straight, about 4 mm. long, the lower slightly longer, 7 mm. broad, 3-lobed, the lobes rounded, 1.5 to 2 mm. long, purple, white-striped toward throat; capsule not seen, rarely formed.—Waste and cultivated regions; West Indies and continental tropical America.

YUCATAN: Progreso, *Flores* in 1931.BRITISH HONDURAS: Gracie Rock, Sibun River, *Gentle* 1530. Toledo, *Peck* 979.6. *JUSTICIA COMATA* (L.) Lam. Encycl. 1: 632. 1783.*Dianthera comata* L. Syst. ed. 10, 850. 1759.*Leptostachya comata* Nees in DC. Prodr. 11: 381. 1847.

An herb up to 20 cm. high; stems weak, ascending or nearly erect, usually branched, often rooting at the lower nodes, glabrous or sparingly pilose; leaf blades lanceolate to oblong or oblong-ovate, 3 to 15 cm. long, acuminate or acute at apex, rounded or narrowed at base, sessile or with petioles up to 2 cm. long; inflorescence axillary, peduncled, the panicle-branches nearly filiform, 2 to 7 cm. long, umbellate, or also terminal and verticillate-paniculate, the branches more or less glandular-pubescent; bracts and bractlets linear, 3 mm. long or less; calyx segments subulate, 1.5 to 2 mm. long; corolla white or purplish, about 6 mm. long, the tube relatively broad, 2 mm. long, the upper lip erect, 3 mm. long, emarginate, the lower lip 4 to 5 mm. long, 3-lobed, the lobes rounded, 1 mm. long; capsule 4 to 5 mm. long, stipitate, puberulent or sometimes glabrous when mature.—Swamps and damp river banks; West Indies and continental tropical America.

BRITISH HONDURAS: Big Fall, Belize River, *Lundell* 1957. Little Cocquericot, Belize River, *Lundell* 4151. Northern River, *Gentle* 913. Sittee River, *Schipp* 622.GUATEMALA, DEPT. PETÉN: El Paso, *Lundell* 1609. Santa Teresa, *Lundell* 2761. Sebal, *Aguilar* 501.7. *JUSTICIA SESSILIS* Jacq. Enum. 11. 1760.*Dianthera sessilis* Gmel. Syst. Nat. 2: 35. 1791.*Justicia pauciflora* Vahl, Eclog. 1: 2. 1796.*Rhytiglossa sessilis* Nees in DC. Prodr. 11: 345. 1847.*Adhatoda tetramera* Bello, Anal. Soc. Esp. Hist. Nat. 10: 301. 1881.

Suffrutescent, up to 80 cm. high; stem branched, pubescent (sometimes in 2 lines), the hairs small and curved; leaves ovate to elliptic, 1 to 3.5 cm. long, acute to obtuse at apex, rounded at base, sparingly pilose, sessile or short-petioled; flowers 1 to 3, borne in the upper axils, sessile; bractlets about 2 mm. long, pilose; calyx 4-parted, the segments lanceolate, 2 to 4

mm. long; corolla purple, puberulent, the tube slender, 10 to 12 mm. long, the lips 6 to 7 mm. long; capsules stipitate, 10 to 12 mm. long, puberulent or glabrescent.—Thickets; West Indies and tropical continental America.

YUCATAN: Calotmul, *Gaumer* 2331. Chichankanab, *Gaumer* 1682. Ixamal, *Gaumer* 351, 532; *Millsbaugh* 79. San Anselmo, *Gaumer* 1681, 1683.

8. *Justicia albobractea* Leonard, sp. nov.

FIG. 17.

Frutex, caule bifariam pubescente; folia oblongo-elliptica, apice breviter acuminata, basi angustata, pubescentia; spicæ terminales pedunculatæ; bractæ ovatæ, laxe imbricatæ, obtusæ, tenues, subvirides, glabræ, ciliatæ, venosæ; bracteolæ ellipticæ; calycis lacinia linearilanceolata, carinata, ciliatæ; corolla ignota; capsula glabra; semina puberulenta.

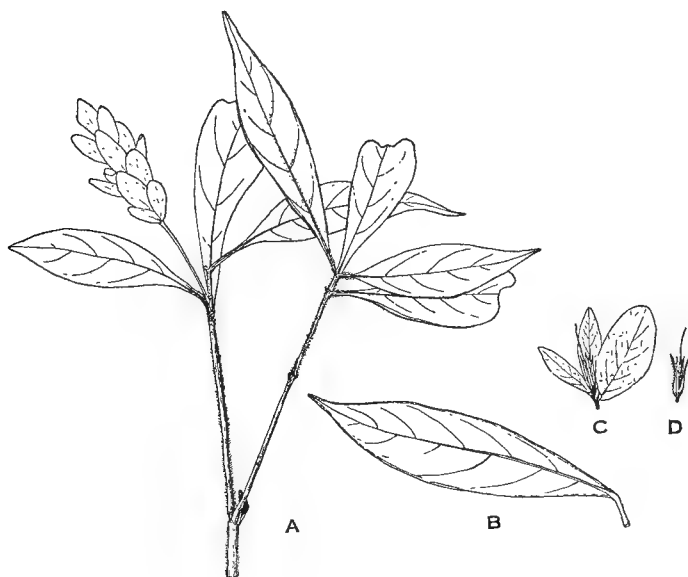


FIG. 17—*Justicia albobractea* Leonard, sp. nov. A, plant; B, leaf; C, bracts and calyx; D, calyx. (A, B, half nat. size; C, D, nat. size.)

Shrubs about 1 meter high; branches pubescent usually in 2 lines, the hairs brownish, conspicuously septate; leaf blades oblong-elliptic, 4 to 8 cm. long, 1.5 to 2.2 cm. wide, short-acuminate at apex, narrowed at base, pubescent, the younger rather densely so; petioles up to 1 cm. long; flowers borne in terminal peduncled spikes about 3 cm. long, the peduncle slender, 1.5 to 2 cm. long; bracts ovate, loosely imbricate, 10 to 13 mm. long, 5 to 8 mm. wide, obtuse, thin, white or whitish, glabrous, ciliate, veiny, the cystoliths rather prominent; bractlets elliptic, 7 mm. long, 4 mm. wide, similar in texture and color to the bracts; calyx segments linear-lanceolate, about 6 mm. long and 1 mm. wide, 8-nerved, keeled, ciliolate; corolla not seen but said to be white; capsule 8 mm. long, glabrous, 4-seeded, the seeds puberulent.

Type in the herbarium of the Field Museum, No. 730,050, collected in forest on hill-top, "Camp 32, G. Survey," British Honduras, altitude about 700 meters, March 2, 1934, by W. A. Schipp (No. 1277).

This is very unlike any other species of *Justicia* found in the Yucatan region. The shape of the bracts suggests a possible relationship with *J. candelariæ* (Hemsl.) Leonard of Costa Rica (*Dianthera candelariæ* Hemsl. Biol. Centr. Amer. Bot. 2: 517. 1882), but in most other respects the two species are very different.

9. *JUSTICIA PECKII* (Blake) Standl. Field Mus. Bot. 12: 369. 1936.

Dianthera peckii Blake, Contr. Gray Herb. n. ser. 52: 97. 1917.

Herb, often suffrutescent at base, 60 to 110 cm. high; stem branched, pubescent in two lines; leaf blades oblong-ovate, 6 to 14 cm. long, 3 to 6 cm. wide, narrowly acuminate at apex, cuneate at base, glabrous except for the costa and nerves, these appressed pubescent; petioles about 1 cm. long; flowers borne in rigid simple axillary spikes up to 24 cm. long, the peduncle about 3 cm. long, the rachis yellowish-pubescent, the lower internodes about 1 cm. long; bracts subulate, 5 mm. long, 1 mm. wide at base; calyx segments subulate, 6 mm. long, keeled, glabrous or the keel bearing a few minute hairs; corolla 15 mm. long, glabrous, pink, the tube 2.5 mm. in diameter, the lips about 8 mm. long, the upper 4 mm. wide, rounded at tip, the lower 3-lobed, 8 mm. wide; capsule oblong, glabrous, 1 cm. long.—Forests of British Honduras.

BRITISH HONDURAS: Cockscomb Mts., *Schipp* 542. Rio Grande, *Schipp* 473. Upper Moho River, *Peck* 722 (type).

10. *JUSTICIA BREVIFLORA* (Nees) Rusby, Bull. Torr. Bot. Club 27: 78. 1900.

Rhytiglossa breviflora Nees in DC. Prodr. 11: 352. 1847.

Dianthera breviflora Hemsl. Biol. Centr. Amer. Bot. 2: 517. 1882.

Suffrutescent, up to 1 meter high; stem erect or ascending, glabrous or pubescent in 2 lines, the hairs retrorsely curved, the nodes swollen; leaves oblong-elliptic to oblong-ovate or lanceolate, 4 to 12 cm. long, 2 to 6 cm. wide, acuminate at apex, rounded or obtuse at base, glabrous; petioles 2 to 10 mm. long; flowers borne in terminal and axillary spikes up to 8 cm. long, these simple or sparingly branched, the rachis pubescent, the internodes narrowly winged; bracts subulate, 4 to 5 mm. long, the bractlets similar but smaller; calyx segments subulate, erect, ciliolate and keeled; corolla about 10 mm. long, sparingly and minutely pubescent, white with purple markings, the lips about 5 mm. long, the upper ovate, entire, the lower 3-lobed, 8 mm. wide at base of lobes; capsule oblong, glabrous, about 10 mm. long; seeds papillose.—Forests; southern Mexico, Guatemala, and British Honduras.

BRITISH HONDURAS: Branch Mouth north of El Cayo, *Bartlett* 11948. Little Mountain Pine Ridge, *Bartlett* 13096. Monkey Fall, *Bartlett* 12017a.

GUATEMALA, DEPT. PETÉN: La Ceiba, *Aguilar* 516. Yaxha-Remate Road, *Lundell* 4096. Yaxmoxan, *Cook & Martin* 201.

21. *BELOPERONE* Nees.

Herbs or shrubs; leaves usually ovate or elliptic, entire; flowers fasciculate in the axils of bracts or cymose, or sometimes borne in spikes or in terminal thyrses, the bracts small or large; calyx 5-parted, the segments narrow; corolla usually red or yellow, the tube slender, elongate, scarcely

ampliate above, the limb deeply 2-lipped, the upper lip narrow, erect, entire, or shallowly 2-lobed, the lower 3-lobed; stamens 2, the anther cells unequal, at least the lower one mucronate at base; ovules 2 in each cell.

Bracts linear-lanceolate, not imbricate.....1. *B. bartlettii*

Bracts obovate or oblong, closely imbricate.

Leaves entire; bracts glandular; pubescence golden yellow.....2. *B. aurea*

Leaves crenate; bracts not glandular; pubescence whitish.....3. *B. magniflora*

1. *Beloperone bartlettii* Leonard, sp. nov.

FIG. 18.

Frutex humilis; caules minute pilosi vel glabrati; folia oblonga vel oblongo-ovata, apice acuminata vel acuta vel obtusa, basi angustata, tenuia, integra, glabra vel parce et minute pilosa; spicæ plures terminales; flores pauci;



FIG. 18—*Beloperone bartlettii* Leonard, sp. nov. A, plant, half nat. size; B, bract; C, bractlets; D, calyx spread to show segments; E, corolla; F, part of stamen to show anther. (B, C, D, E, nat. size; F, twice nat. size.)

bractæ lineari-lanceolatæ, minute pilosæ; calycis lacinie lineari-lanceolatæ, minute pilosæ; corolla pubescens, subflava, labio superiore minuto, bilobo, inferiore trilobo.

A low sprawling shrub; stem pilosulous, or glabrate below; leaf blades oblong to oblong-ovate, 3 to 17 cm. long, 2 to 7 cm. wide, usually acuminate but sometimes acute or obtuse at apex, narrowed at base, thin, entire, glabrous or sparingly pilosulous, the hairs confined chiefly to the costa and veins; petioles about 1 cm. long, pilosulous; flowers borne in a terminal panicle of several few-flowered spikes, the branches of the inflorescence pilosulous; bracts linear-lanceolate, 5 mm. long, pilosulous; calyx segments linear-lanceolate, 1 cm. long, 1 to 1.5 mm. wide, pilosulous; corolla 3 cm. long, finely pubescent, pale yellow, the upper lip triangular, about 1 cm.



FIG. 19—*Beloperone aurea* Leonard, sp. nov. A, plant, half nat. size; B, bract; C, bractlets; D, calyx spread to show segments; E, corolla; F, part of stamen to show anther. (B, C, D, E, nat. size; F, twice nat. size.)

long, minutely 2-lobed at tip, the lower lip slightly longer, 3-lobed, the lobes rounded, 1 to 2 mm. long; stamens reaching tip of upper lip, the anther cells unequal, appendaged at base.

Type in the U. S. National Herbarium, No. 1,492,608, collected on River Bluffs at El Cayo, British Honduras, Feb. 14, 1931, by H. H. Bartlett (No. 11477).

This species apparently has no close relatives in Central America.

2. *Beloperone aurea* Leonard, sp. nov.

FIG. 19.

Frutex; caules pubescentes vel glabrati, pilis appressis vel patulis, flavis; folia oblongo-elliptica, apice acuminata, basi angustata, tenuia, integra, minute pilosa vel glabrata; spicæ subcapitatae, terminales axillaresque; bracteæ

obovatæ, obtusæ vel acutæ, imbricatæ, puberulentæ, glandulosæ; calycis lacinia oblanceolatæ, puberulentæ, glandulosæ; corolla purpurea (?), puberulenta, labio superiore obscure bilobo, inferiore trilobo.

Shrub; stems subterete, pubescent, the hairs appressed or ascending, golden yellow, the lower part of the stem glabrate, the nodes somewhat swollen; leaf blades oblong-elliptic, 8 to 16 cm. long, 3 to 6 cm. wide, acuminate at apex, narrowed at base, thin, entire, pilosulous or glabrate, the hairs confined chiefly to the costa and veins; petioles up to 2 cm. long; flowers borne in short, peduncled, subcapitate axillary and terminal spikes, 1 to 1.5 cm. long, the peduncles up to 1 cm. long, pubescent; bracts obovate, 7 to 8 mm. long, 4 mm. wide, obtuse to acute, closely imbricate, rather sparingly puberulent, gland-dotted; bractlets oblanceolate, 7 mm. long, 1.5 mm. wide, acute, puberulent; calyx segments similar to bractlets, 1-nerved, the nerve swollen at base; corolla 3 cm. long, finely puberulent, purplish (?), the lips about 12 mm. long, narrow, the upper obscurely 2-lobed, the lower 3-lobed, the lobes about 2 mm. long; anther cells about 1.75 mm. long, unequally attached, appendaged at base; ovary pubescent.

Type in the U. S. National Herbarium, No. 1,586,265, collected on the Fallabón-Yaxha Road, Department of Petén, Guatemala, March 22, 1933, by C. L. Lundell (No. 2189).

Apparently unrelated to any other Central American member of the genus. Easily recognized by the golden yellow pubescence and imbricate glandular-punctate bracts.

3. *Beloperone magniflora* (Blake) Leonard.

Diclyptera magniflora Blake, Contr. Gray Herb. n. ser. 52: 98. 1917.

Beloperone crenata Standl. Carnegie Inst. Wash. Pub. No. 461: 88. 1935.

Shrub 2 meters high; stem pubescent in 2 lines, glabrescent; leaf blades oblong, elliptic or oblong-ovate, 12 to 25 cm. long, 3 to 8 cm. wide, acuminate at apex (the tip blunt), narrowed at base, crenate, glabrous, or the costa and veins sparingly pubescent; petioles 1 to 2 cm. long; flowers borne in dense spikes 2 to 3.5 cm. long, these forming a terminal panicle up to 14 cm. long, the rachis quadrangular, pubescent; bracts oblong, about 7 mm. long and 3 mm. wide, acute to obtuse, pubescent and ciliate, imbricate; calyx segments oblong to lanceolate, 6 mm. long, 1 to 2 mm. wide, acute, ciliolate; corolla 6 cm. long, pubescent, light yellow, the lips 2 cm. long, narrow, the upper minutely 2-lobed, the lower minutely 3-lobed; anther cells unequal, appendaged at base.—Forests of British Honduras.

BRITISH HONDURAS: Pueblo Viejo, *Schipp* 694 (type of *B. crenata*). Toledo, *Peck* 622a (type of *Diclyptera magniflora*); *Stevenson* 82, 90.

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BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

XI

**NOTES ON DIOSCOREA, WITH SPECIAL REFERENCE TO
THE SPECIES OF THE YUCATAN PENINSULA**

By C. V. MORTON

[Issued June 25, 1936]



NOTES ON DIOSCOREA, WITH SPECIAL REFERENCE TO THE SPECIES OF THE YUCATAN PENINSULA ¹

The following scattering notes on various Mexican and Central American species of *Dioscorea* here recorded are preliminary to a more complete treatment. Despite the fact that the family Dioscoreaceæ has recently been monographed by Dr. R. Knuth ² there are a good many species as yet imperfectly known, owing to the dicecious condition prevailing. A number of species, known from one sex only, have been placed in the wrong section or subgenus. Several such cases are commented on below.

Knuth's work in *Das Pflanzenreich* has much to commend it, especially in its sectional arrangement, but unfortunately the keys are too often drawn from varying leaf characters or even from geographic range alone, rather than from the more fundamental differences that are to be found in the inflorescences.

Despite their small size, the staminate flowers of *Dioscorea* exhibit great differences in structure, and without their dissection a conclusive identification can rarely be made. It is, therefore, unfortunate that so many new species have recently been described from fruiting specimens only, inasmuch as the relationship of these can rarely be determined definitely. A general and conservative treatment of the American species is much to be desired.

SPECIES OF THE YUCATAN PENINSULA

Seeds winged on the lower side only; stems dextrorsely climbing
(sinistrorsely in *D. bartlettii*).

Perianth segments hairy; flowers fasciculate; stamens 6.

Staminate flowers pedicellate; anthers extrorse; stems dextrorse; plants without large epigaeous rhizome..... 1. *D. pilosiuscula*

Staminate flowers sessile; anthers introrse; stems sinistrorse; plants with a large woody epigaeous rhizome covered with polygonal plates 2. *D. bartlettii*

Perianth segments glabrous; flowers solitary on the axis of the raceme; stamens 3; anthers introrse..... 3. *D. convolvulacea*

Seeds winged all around; stems sinistrorsely climbing (except rarely in *D. macrostachya*).

Ovules and seeds 3 or 4 in each cell of the ovary; filaments connate throughout 4. *D. gaumeri*

Ovules and seeds always 2 in each cell; filaments free or barely connate at base.

Fertile stamens 6.

Filaments slender, alternately unequal..... 5. *D. floribunda*

Filaments equal.

Anthers borne on slender filaments, introrse..... 6. *D. bernoulliana*

Anthers subsessile, upwardly dehiscent..... 7. *D. macrostachya*

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²*Das Pflanzenreich* IV. 43: 1-387. 1924.

Fertile stamens 3, alternating with 3 staminodia.

Flowers sessile on the rhachis or, if pedicelled, borne in fascicles.

Anther cells widely separated by the enlarged connective.

Flowers in fascicles along the rhachis..... 8. *D. polygonoides*

Flowers solitary on the rhachis..... 9. *D. yucatanensis*

Anther cells not separated..... 10. *D. matagalpensis*

Flowers pedicelled and solitary on the rhachis..... 11. *D. densiflora*

Doubtful species 12. *D. hondurensis*

1. *Dioscorea pilosiuscula* Bert. in Spreng. Syst. Veg. 2: 152. 1825.

Founded on material collected in Hispaniola by Bertero. A critical species of which only the following specimen has been seen from our region.

YUCATAN: Izamal, Gaumer 820.

2. *Dioscorea bartlettii* Morton, sp. nov.

Subg. *Hemia*, Sect. *Sphaerantha*. Rhizoma sublignosum, epigæum, semi-ellipsoideum, maximum, in superficie lamellatum; caules teretes, sinistrorsum volubiles, minutissime puberulenti, inferne spinosi; folia alterna, longe petiolata (petiola usque ad 7 cm. longo, ca. 1 cm. supra basin articulato), lamina ovata, maxima 16.3 cm. longa et 14.5 cm. lata, integra, glauco-viridi, chartacea, apice abrupte acuminata, basi late cordata vel fere truncata, utrinque glabra, 7-nervata; inflorescentia ♂ axillaris, usque ad 20 cm. longa, ramosa, rhachibus dense puberulis, floribus sessilibus, aggregatis, binis vel ternis, raro solitariis, bracteatis, bracteis lineari-lanceolatis, extus parce puberulis; perianthium ca. 1.5 mm. longum, extus puberulum, segmentis ovatis, obtusiusculis, exterioribus patulis, interioribus erectis; stamina fertilia 6, filamentis liberis, brevissimis, ca. 0.25 mm. longis, aequalibus, basi perianthii insertis, antheris introrsis, ca. 0.25 mm. longis, loculis contiguis, discretis, connectivis incrassatis; rudimentum stylinum nullum; inflorescentia ♀ axillaris, spicata, interdum ramosa, usque ad 23 cm. longa; perianthii segmenta ♀ florum ovata, 2 mm. longa, basi purpurascens, apicem versus lutescentia, acuta, integra, patula, externe basi et margine parce puberula; stamina sterilia 6, perianthii segmentis opposita, filamentis brevissimis, crassis, in annulo plus minusve connatis, partibus liberis late deltoideis, tubo brevissimo perianthii segmentis basi adnato, antheris bilocularibus, sterilibus; styli 3, brevissimi, crassi, divaricati; capsulæ oblongæ, usque ad 4.5 cm. longæ et 2 cm. latæ, sublignosæ, valvis marginem versus corrugatis, apice obtusis, mucronatis, basi obtusis, minutissime puberulentis; semina ca. 2.5 cm. longa, ala superiore obsoleta, ala inferiore expansa, membranacea.

Type a fruiting specimen in the U. S. National Herbarium, No. 1,493,923, collected at Uaxactun, Dept. of Petén, Guatemala, Apr. 1, 1931, by H. H. Bartlett (No. 12425).

Additional specimens examined:

BRITISH HONDURAS: El Cayo, Bartlett 12901 (♀), 18898; Chanek 6 (♂).

GUATEMALA: Near Finca Sepacuité, Alta Verapaz, Cook & Griggs 274 (♂). Uaxactun, Bartlett 12140. Uaxactun to San Clemente, Bartlett 12813.

I take pleasure in naming this remarkable plant for Professor Bartlett, in recognition of his important contributions to tropical American botany. The habit of the species is well illustrated (in Plate 14, fig. 1, of the present volume) by Professor Bartlett, who suggests that it may be related to *Testudinaria cocolmea* Procopp.¹ The latter species was described from a rhizome alone, collected near Pochutla, Oaxaca, and it has for this reason remained obscure ever since. Knuth refers it without question to the synonymy of *Dioscorea macrostachya* Benth., but Standley² refers it only with doubt to that species. His comment is as follows: "*Testudinaria cocolmea* is referred here with doubt by Uline; it may be referable rather to *D. remotiflora*, or perhaps it is a distinct species. The plant so named is very imperfectly known." A further note giving information, obtained from Dr. B. P. Reko, concerning uses of the plant, is given by Standley in the appendix.³ There is in the National Herbarium a photograph of the "cocolmea" of southern Oaxaca, obtained near Pochutla, the type locality. This shows a plant differing from *D. bartlettii* in having a low depressed rather than ellipsoidal rhizome (similarly covered with turtle-like plates), unarmed lower stems, these apparently dextrorsely rather than sinistrorsely climbing, and more deeply cordate, 9- rather than 7-nerved leaves. It seems probable that Standley is correct in saying that it is perhaps referable to *Dioscorea remotiflora* (subgenus *Eudioscorea*), in which case its relationship with *D. bartlettii* is remote. The latter species is the first member of the subgenus *Helmia* known to possess a large epigaeous rhizome. The species of the true subgenus *Testudinaria* are known only from the Old World, and are quite unrelated to either *D. bartlettii* or *T. cocolmea*. The fact that species with this peculiar development of the rhizome are now known to belong to three widely different subgenera of *Dioscorea* shows the futility of recognizing *Testudinaria* as a genus based on this character alone, as has recently done by Hutchinson.⁴

Professor Bartlett brought back a rhizome from Uaxactun and the species is now under cultivation in the botanical garden of the University of Michigan. The plant flowered in July 1933, and the description of the pistillate flowers above has been drawn from an herbarium specimen made at that time, kindly forwarded to me by Mr. Roy M. Chatters of the University of Michigan.

3. *Dioscorea convolvulacea* Schlecht. & Cham. Linnæa 6: 49. 1831.

Of this common and variable species I have seen only one specimen from the Yucatan peninsula, namely *Schipp* 860, from Stann Creek Railway, British Honduras. The specimen is apparently referable to the variety *glabra* (Hemsl.) Uline.

¹ Bot. Centralbl. 49: 201. 1892.

² Contr. U. S. Nat. Herb. 23: 144. 1920.

³ Op. cit. 1646. 1926.

⁴ Families of Flowering Plants 2: 148. 1934.

4. *Dioscorea gaumeri* Knuth, Notizblatt Bot. Gart. Berlin 7: 199. 1917.

Higinbothamia synandra Uline, Field Mus. Publ. Bot. 1: 414. 1899.

Dioscorea synandra Standl. Field Mus. Publ. Bot. 3: 231. 1930, not Uline, 1924.

Dioscorea gaumeri Knuth was not named as a transfer of *Higinbothamia synandra* Uline, but as a new species of the subgenus *Helmia*, section *Monadelphæa*, of which it was considered the only North American representative. It was keyed out on the basis of characters afforded by the stamens and staminate perianth segments, yet in the description only pistillate flowers are described. The description (based on an unnumbered Yucatan plant collected by Gaumer) agrees so closely with *Higinbothamia synandra* that I have no doubt as to the identity of the two species.

I do not believe that *Higinbothamia* may be retained as a genus, even though the presence of three or four ovules in each cell of the ovary is anomalous in *Dioscorea*. However, the seeds are definitely described and figured by Uline as winged all around and consequently the species can not be placed in the subgenus *Helmia*. It belongs in the subgenus *Eudioscorea* and may be regarded as section *Higinbothamia* (Uline) Morton, comb. nov., most closely related to section *Oxypetalum* but distinguishable by having the filaments united into a cylindrical column, as well as by the number of ovules.

Specimens examined:

YUCATAN: *Gaumer* 1580 ♂ ♀.

5. *Dioscorea floribunda* Mart. & Gal. Bull. Acad. Brux. 9²: 391. 1842.

Described from a staminate plant climbing on oaks and acacias near Zacupan, Veracruz, Mexico, altitude 900 meters, by Galeotti (No. 5460). It is an easily recognized species, type of the section *Heterostemon* Uline. A much older sectional name, however, is *Anisostemon* Schlecht.,¹ proposed solely to contain *D. floribunda* Mart. & Gal.

RANGE: Southern Mexico to Honduras and El Salvador.

Specimens examined:

VERACRUZ: Zacupan, *Purpus* 7772. Mislantla, *Purpus* 5974.

OAXACA: Apango, *Reko* 3477.

YUCATAN: Izamal, *Gaumer* 927 p.p.

CHIAPAS: San Sebastián, *Collins & Doyle* 187.

BRITISH HONDURAS: San Antonio, *Bartlett* 13021. All Pines, *Schipp* 675.

GUATEMALA: Baja Verapaz, *von Tuerckheim* 3994.

HONDURAS: Copán, *Calderón* 1838.

EL SALVADOR: Colina de Santa Tecla, *Calderón* 1733. Cerro de la Olla, *Calderón* 1033. Santo Tomás, *Calderón* 1298. San Salvador, *Calderón* 1268; *Standley* 19289, 20544.

¹ *Linnæa* 17: 605. 1843.

6. *Dioscorea bernoulliana* Prain & Burk. Kew Bull. Misc. Inf. 1916: 192. 1916.

I have seen no authentic material of this species, which has previously been known only from the type collection, a staminate plant collected between Escomillas and Palohueco, Guatemala, by Bernoulli & Cario (No. 847). The specimens here cited are all in fruit, the capsules being glabrous, dark brown, about 1.4 cm. long and 1.7 cm. broad, and the seeds orbicular (about 3 mm. in diameter) and completely surrounded by a dark brown membranous wing varying from 2 to 4 mm. in width.

Specimens examined:

BRITISH HONDURAS: Little Mountain Pine Ridge, El Cayo District, *Bartlett* 11877. Cornhouse Creek, Belize District, *Bartlett* 11298. Corozal District, *Gentle* 358, 638.

GUATEMALA, DEPT. PETÉN: Uxactun, *Bartlett* 12292. La Libertad, *Aguilar* 470.

7. *Dioscorea macrostachya* Benth. Plant. Hartw. 73. 1841.

Dioscorea anconensis Knuth, Repert. Spec. Nov. Fedde 28: 82. 1930.

I have examined two specimens of the type collection of *D. anconensis* Knuth, from Ancon Hill, Panama Canal Zone (*Killip* 12085), and find that it is not separable in any way from *D. macrostachya*. Knuth placed his species in the subgenus *Helmia*, but the seeds are definitely of the *Eudioscorea* type.

RANGE: Very common from Veracruz and Oaxaca south to Panama.

I have seen the following specimens from Yucatan: *Gaumer* 794, 925, 1578, all without special locality.

8. *Dioscorea polygonoides* H. & B. ex Willd. Sp. Pl. 4: 795. 1805.

A common species in Panama, included by Standley¹ in *D. macrostachya* Benth., apparently by error, since it belongs to a different section of the genus.

RANGE: Yucatan, Panama, Northern South America, and throughout the West Indies.

Specimens examined:

YUCATAN: Chichankanab, *Gaumer* 1579. Suitun, *Gaumer* 23433, 23434, 23435. Without special locality, *Gaumer* 928.

PANAMA: Gamboa, *Pittier* 4802. Camino de Corozal, *Heriberto* 248. Paraiso Station, *Hayes* 27. Sosa Hill, *Standley* 25232, 25281, 26466, 26489. Balboa, *Standley* 25419, 25555, 26984, 27149, 27164, 29285, 32141. Las Cascadas Plantation, *Standley* 25676, 25771. Along Las Cruces Trail, between Fort Clayton and Corozal, *Standley* 29049. Between France Field and Catival, *Standley* 30363.

¹ Flora of the Panama Canal Zone, Contr. U. S. Nat. Herb. 27: 115. 1928.

9. *Dioscorea yucatanensis* Uline, Field Mus. Publ. Bot. 1: 416. 1899.

This species (misspelled *yucatensis*) is placed by Knuth in the section *Oxypetalum* and is keyed as having the flowers pedicelled. An examination of the type specimen, kindly lent by the Field Museum, shows that the flowers are sessile and it is, therefore, most likely that *D. yucatanensis* should be placed in the section *Lychnostemon*, near to *D. polygonoides*.

On the basis of *H. H. Smith* 2300 from Santa Marta, *D. yucatanensis* is ascribed to Colombia by Knuth. The specimen studied by him is in the National Herbarium and is by no means related to *D. yucatanensis*, belonging rather to a different subgenus, i.e. *Helmia*, sect. *Centrostemon*.

A collection from Duck Run, El Cayo District, British Honduras (Bartlett 11560) may represent this species.

10. *Dioscorea matagalpensis* Uline, Bot. Jahrb. Engl. 22: 432. 1897; Uline, Field Mus. Publ. Bot. 1: 417. 1899.

The type is a pistillate plant collected at Cañada Yasica, Dept. Matagalpa, Nicaragua, by Rothschuh (No. 392). This species is closely related to both *Dioscorea polygonoides* H. & B. and *D. yucatanensis*, but is easily distinguished by the staminate flowers. The capsules are small and bear two minute ridges along the middle of each valve.

RANGE: Yucatan to Costa Rica.

Specimens examined:

YUCATAN: Mérida, *Schott* 929. Suitun, *Gaumer* 23432. Without special locality, *Gaumer* 1391, 24331.

GUATEMALA, DEPT. PETÉN: Uxactun, *Bartlett* 12128, 12353.

BRITISH HONDURAS: Stann Creek Valley, *Schipp* S-290. Rio Grande, *Schipp* 1135. El Cayo, *Chanek* 149. Little Cocquericot, *Lundell* 4156.

COSTA RICA: Naranjos Agrios, Guanacaste, *Standley & Valerio* 46447, 46522.

11. *Dioscorea densiflora* Hemsl. Biol. Centr. Amer. Bot. 3: 356. 1884.

The type specimen was collected in the Valley of Córdoba, Veracruz, Mexico, by Bourgeau (No. 1487). It may be doubted if *Dioscorea carionis* Prain & Burk. is sufficiently distinct from the present species.

Specimens examined:

VERACRUZ: Valley of Córdoba, *Bourgeau* 1487, 1783.

TABASCO: Mayito, *Rovirosa* 683.

YUCATAN: Cozumel Island, *Gaumer* (fide Knuth).

BRITISH HONDURAS: El Cayo, *Bartlett* 11444.

GUATEMALA: Cubilquitz, *von Tuerckheim* 8012.

12. *Dioscorea hondurensis* Knuth, Repert. Spec. Nov. Fedde 38: 120. 1935.

This recently described species, of which I have seen no material, is founded on *Peck* 549, collected on the upper Moho River, British Honduras.

For it Knuth creates a new section, *Triangulares*, characterized as follows: "Folia alterna. Capsula latiores quam longae, triquetra." This inadequate diagnosis, to which the specific description adds no characters of sectional importance, does not permit the proper placing of *D. hondurensis* in the key. Knuth does not definitely refer the section *Triangulares* to a subgenus, but the broad capsules indicate that it may belong to *Eudioscorea*. According to the description *D. hondurensis* has cordate-ovate, glabrous 9-nerved leaves, 16 cm. long and 11 cm. wide, and "obtriquetrous" capsules 4.5 cm. wide and 3 cm. long.

EXTRALIMITAL SPECIES

Dioscorea, sect. *Napæophyton* Morton, sect. nov.

Caules dextrorsum volubiles, glabri, fistulosi; folia tenuiter membranacea, 9-nervata; inflorescentia ♂ racemosa, elongata, floribus solitariis, breviter pedicellatis; perianthium tubuloso-obconicum, lobis brevibus, reflexis; stamina tres, filamentis tubo perianthii adnatis, antheris globosis, introrsis. Staminodia nulla. Inflorescentia ♀ ignota. Species unica, *D. mitis* Morton.

In the absence of fruiting specimens this new section can not be placed definitely within the genus. It is probably a member of the subgenus *Helmia*, in which case it will find a position next to the section *Trigonobasis*, being distinguished by the elongate perianth tube and short reflexed lobes. If, however, it proves to belong to *Eudioscorea*, it should be placed near section *Siphonantha*, which differs in having the flowers borne in small cymes along the rachis. Moreover, the anthers in *Siphonantha* are extrorse and the plants climb sinistrorsely.

Dioscorea mitis Morton, sp. nov.

Caules volubiles, ca. 3 mm. crassi, glabri, fistulosi, laeves; folia alterna, petiolata (petiolo 3.5-4 cm. longo), lamina late ovata vel subdeltoidea, tenuiter membranacea, usque ad 6.5 cm. longa et 7.5 cm. lata (fortasse immatura), basin versus interdum sublobata, apice acriter et breviter acuminata, basi cordata (sinu lato apertoque), utrinque glabra, 9-nervata; inflorescentiae ♂ racemosae, axillares, solitariae, binae vel ternae, elongatae, usque ad 20 cm. longae, graciles, nutantes, floribus solitariis, breviter pedicellatis, pedicellis usque ad 2 mm. longis, bracteatis, bracteis lanceolatis, brunneis; perianthium tubuloso-obconicum, glabrum, tubo ca. 2 mm. longo, apice ca. 1.5 mm. lato, lobis reflexis, ca. 0.75 mm. longis; stamina 3, filamentis tubum perianthii aequantibus et eo fere omnino adnatis, parte libera brevi, antheris magnis, introrsis, loculis parallelis, oblongis, discretis; rudimentum stylinum magnum. Inflorescentia ♀ deest.

Type in the U. S. National Herbarium, No. 337,885, collected at Pihuamo, Michoacán, Mexico, June 16, 1892, by M. E. Jones (No. 6).

Dioscorea tenebrosa Morton, sp. nov.

Subg. *Helmia*, sect. *Trifoliatae*. Caules sinistrorsum vel dextrorsum volubiles, graciles, glabri; folia alterna, petiolata (petiolo usque ad 3 cm. longo),

lamina membranacea, glabra, tripartita, segmentum medium lanceolatum, usque ad 8 cm. longum et 3.5 cm. latum, apice acuminatum, basi cuneatum, trinervatum, segmenta lateralia breviora, maxima 5 cm. longa et 2.5 cm. lata, plus minusve obliqua et falcata; inflorescentiæ ♂ racemosæ, axillares, solitariae vel binæ, non ramosæ, usque ad 10 cm. longæ, floribus solitariis, approximatis, pedicellis brevibus, 1-1.5 mm. longis, glabris; perianthium rotatum, 5-6 mm. diametro, lobis fere liberis, oblongis, glabris; stamina 3, margine disci carnosius inserta, antheris sessilibus, sursum dehiscentibus; rudimentum stylinum nullum; inflorescentia ♀ deest.

Type in the U. S. National Herbarium, No. 933,713, collected at Pansamala, Dept. Alta Verapaz, Guatemala, altitude about 1100 meters, May, 1887, by H. von Tuerckheim (No. 1241).

Distributed as *D. trifoliata* H. B. K., a South American species, from which it differs in its sessile anthers, which are inserted on the edge of a fleshy hypogynous disk.

Dioscorea lepida Morton, sp. nov.

Subg. *Helmia*, sect. *Trigonobasis*. Caules dextrorsum volubiles, longi, fistulosi, glabri, herbacei, striati; folia alterna, longe petiolata, lamina membranacea, ovata, usque ad 12 cm. longa et 7.3 cm. lata, basi cordata, sinu aperto, apice longe acuminata, utrinque glabra, viridi, 9-nervata, nervis subtus prominentibus; inflorescentia ♂ deest; inflorescentia ♀ axillaris, satis longa et densa, floribus brevissime pedicellatis; capsulæ virides, anguste oblongæ, 10-16 mm. longæ, 5-7 mm. latæ, glabræ, valvis mox dehiscentibus, papyraceis; semina 3 mm. longa et 1.5 mm. lata, deorsum alata, ala membranacea 4-5 mm. longa.

Type in the U. S. National Herbarium, No. 1,252,626, collected at Laguna de la Chonta, northeast of Santa María de Dota, Province of San José, Costa Rica, altitude 2000-2100 meters, Dec. 18, 1925, by P. C. Standley (No. 42133).

Additional specimens examined:

COSTA RICA: Near Finca La Cima, north of El Copey, Prov. San José, alt. 2100-2400 meters, *Standley* 42730.

PANAMA: Bismark, above Penonome, Mar. 18, 1908, *Williams* 593 (Herb. New York Botanical Garden).

Easily distinguished from other species of the section *Trigonobasis* by the small, acute, readily dehiscent capsules.

Dioscorea urophylla Hemsl. Biol. Centr. Amer. Bot. 3: 361. 1884.

? *Dioscorea samydea* var. *corcovadensis* Uline ex Knuth, Notizblatt Bot. Gart. Berlin 7: 201. 1917.

This species, founded on *Hayes* 190 from Panama, is put by Knuth in the subgenus *Eudioscorea*, section *Macrogynodium*, in which section it is quite out of place. The copious material now available shows it to be a member of the subgenus *Helmia*, section *Chondrocarpa*, and probably the same as the plant treated by Knuth as *Dioscorea samydea* var. *corcovadensis*.

It is to be noted that all the staminate specimens have been collected between June and early September and the fruiting specimens between December and February.

Specimens examined:

PANAMA: Las Sabanas, *Pittier* 6680. Gamboa, *Pittier* 3705. Tapia River, *Maxon & Harvey* 6697. Between Corozal and Ancón, *Pittier* 6772. Sabana de Panama, *Gervais* 154. Panama City, *Riley* 144; *Macbride* 2611. Corozal, *Standley* 27337. Punta Paitilla, *Standley* 26232.

Dioscorea jaliscana S. Wats. Proc. Amer. Acad. 22: 438. 1887.

Dioscorea hirsuticaulis Rob. Proc. Amer. Acad. 29: 324. 1894.

Of this species the following specimens have been examined:

MEXICO: Barranca of Tequila, Jalisco, *Pringle* 4572. Near Guadalajara, Jalisco, *Pringle* 4528. Rio Blanco, *Palmer* 542 (type).

Knuth keys out *D. jaliscana* (and *D. hirsuticaulis*) from *D. convolvulacea* on the basis of style characters, the styles of *D. convolvulacea* being said to be distinct and those of *D. jaliscana* united into a column. However, these differences are contradicted in his own description of *D. jaliscana*, which reads as follows, "Styli distincti, incurvati, integri." His description of the styles of *D. convolvulacea* is "Styli distincti, divaricato-recurvati, apice integri et fusci, basibus fundo perianthii adnatis." Examination of specimens proves that in both species the styles are connate at base in a low ring.

Dioscorea macrostachya var. *palmeri* (Knuth) Morton, comb. nov.

Dioscorea palmeri Knuth, Notizblatt Bot. Gart. Berlin 7: 203. 1917.

The type was collected at Manzanillo, Colima, Mexico, in December 1890, by Dr. Edward Palmer (No. 1329).

Very close to *D. macrostachya*, from which it is distinguished by its lightly repand leaves, a character of dubious importance in this genus. Typical *D. macrostachya* is, however, not known to occur in western Mexico north of Oaxaca.

In Das Pflanzenreich Knuth credits *D. palmeri* to Uline but in the original description definitely assigns the species to himself, not mentioning the name of Uline in any way.

Dioscorea astrostigma Uline, Bot. Jahrb. Engl. 22: 431. 1896.

The type is from the Volcán del Fuego, Dept. Zacatepéquez, Guatemala, altitude about 1500 meters, collected in March 1892, by Capt. John Donnell Smith (No. 2565). The following additional specimens have been studied:

EL SALVADOR: Ahuachapán, *Standley* 19920. Izalco, *Standley* 21842.

Knuth, in Das Pflanzenreich, reduces this species to synonymy under *D. macrostachya* Benth. The character upon which it was principally based, namely the 4-lobed stigmas, has been found (though rarely) in

typical *D. macrostachya*, but an additional difference may be noted in the shape of the capsule, of which the valves (in *D. astrostigma*) are pithy and triangularly thickened at base, thus giving the capsule a decidedly inflated appearance. On the other hand, in *D. macrostachya* the capsule valves are almost flat. This difference justifies at least the temporary retention of the species.

***Dioscorea remotiflora* Kunth var. *maculata* Uline, Bot. Jahrb. Engl. 22: 422. 1896.**

A well-marked variety, founded on *Pringle* 4527 from Guadalajara, Jalisco, having the stems and the petioles of the lower leaves conspicuously alate. Here are to be referred *Reko* 3408 and 3504, from Cerro Huatulco and Las Pilas respectively, which form the basis of Standley's report¹ of *D. alata* L. as naturalized in Oaxaca.

***Dioscorea nelsoni* Uline ex Knuth, Notizblatt Bot. Gart. Berlin 7: 202. 1917.**

The type was collected between Topana, Oaxaca, and Tonala, Chiapas, Mexico, altitude 60-150 meters, Aug. 1-3, 1895 (*Nelson* No. 2855a, erroneously cited in the original description as 2855). The following specimens are also of this species:

OAXACA: Santa Efigenia, *Nelson* 2828.

GUATEMALA: Buena Vista, Dept. Santa Rosa, *Heyde & Lux* 6391.

EL SALVADOR: Sonsonate, *Calderón* 1691. El Angel, *Calderón* 2056.

This species is easily distinguished in the section *Macrogynodium* by reason of its large, glabrous, coriaceous capsules and large, glabrate, deeply cordate leaves. *Palmer* 124 from Colima, Mexico, cited by Knuth in the original description, is wrongly referred here, being a specimen of *D. remotiflora* Kunth.

***Dioscorea cymosula* Hemsl. Biol. Centr. Amer. Bot. 3: 355. 1884; 5: pl. 90. 1888.**

Dioscorea permollis Knuth, Das Pflanzenreich IV. 43: 61. 1924.

The type of *D. cymosula* was collected at Loseria, Panama, by S. Hayes (No. 726). The following specimens have been seen:

PANAMA: Ancon Hill, *Killip* 3035 (type of *D. permollis*), 12086. Gamboa, *Pittier* 4800.

Knuth described his new species *D. permollis* as belonging to the subgenus *Helmia*, sect. *Dematostemon*. In the aspect of the staminate inflorescences there is, to be sure, a superficial similarity to the section *Dematostemon*; but the alternately somewhat unequal filaments inserted on the corolla segments, the introrse anthers, and the sinistrorsely climbing stems

¹ Contr. U. S. Nat. Herb. 23: 143. 1920.

all indicate that the plant belongs to the subgenus *Eudioscorea*, sect. *Macrogynodium*. Killip's 12086 (from the type locality of *D. permollis* and agreeing in all respects with the type, Killip 3035) bears capsules with seeds showing definitely that the plants belong to the subgenus *Eudioscorea*. The specimens agree so closely with the description and figure of *Dioscorea cymosula* Hemsl. that there can scarcely be any doubt of their identity. The variety *duchassaingii* Uline¹ seems from description not to differ in any essential character. The other two described varieties are from Mexico and are undoubtedly specifically different.

***Dioscorea villosa* L. Sp. Pl. 1033. 1753.**

This eastern United States species was reported from Mexico by Knuth on the basis of two specimens, one collected by Liebmann and one by Rose (No. 3434). The Rose specimen, which is in the U. S. National Herbarium, bears the note "*Diosc. villosa* Linn. ♀, form with pubescent capsules. Uline." It is a form of *D. remotiflora* Kunth. The Liebmann specimen is not accessible, but there is little doubt but that it has also been misidentified.

***Dioscorea composita* Hemsl. Biol. Centr. Amer. Bot. 3: 359. 1884.**

Dioscorea tepinapensis Uline ex Knuth, Notizblatt Bot. Gart. Berlin 7: 204. 1917.

Hemsley founded his species on a pistillate specimen collected at Orizaba, Veracruz, Mexico, by Botteri (No. 1184), and says definitely that he had seen no staminate material. Unfortunately, Botteri's No. 1184 is a mixture and the material in some herbaria consists only of staminate specimens of *D. macrostachya* Benth. Consequently Knuth reduced Hemsley's species to the synonymy of *D. macrostachya*. The true *D. composita* was redescribed by him under Uline's manuscript name *D. tepinapensis*.

In addition to specimens of the type collection I have seen the following specimens:

VERACRUZ: Atoyac, Kerber 190. Tepinapa, Liebmann (type collection of *D. tepinapensis*).

OAXACA: Cosolapan, Salazar s. n. Totontepec, Nelson 793.

TABASCO: Familté, Roviroa 643. Atasta, Roviroa 601.

***Dioscorea pringlei* Rob. Proc. Amer. Acad. 29: 323. 1894.**

The type was collected at the Barranca near Guadalajara, Jalisco, Mexico, Sept. 7, 1893, by C. G. Pringle (No. 4526).

Although Knuth refers this species to the section *Polyneuron*, an examination of material of the type collection shows that staminodia are represented by minute tubercles at the base of the perianth segments. A specimen collected at Pedro Paulo by J. N. Rose has well-developed stami-

¹ Ex Knuth, Notizblatt Bot. Gart. Berlin 7: 202. 1917.

nodia but is otherwise similar. *D. pringlei* may, therefore, be referred to the section *Sarcocapsa*. It is in fact close to *D. plumifera*, although probably distinct.

Dioscorea, sect. *Adinostemon* Morton, sect. nov.

Caules dextrorsum volubiles; flores ♂ solitarii, breviter pedicellati; stamina fertilia tres, sterilia (staminodia) tres, omnia basi breviter connata; antheræ oblongæ, introrsæ; rudimentum stylinum nullum. Flores ♀ ignoti. Species unica: *Dioscorea salvadorensis* Standl.

***Dioscorea salvadorensis* Standl. Journ. Wash. Acad. Sci. 13: 365. 1923.**

This species was referred to the section *Trigonobasis* by Knuth, who had seen no specimens. The presence of staminodia, being of fundamental systematic importance in the genus, fully justifies the creation of a new section, occupying in the subgenus *Helmia* a position similar to that of *Oxypetalum* in *Eudioscorea*. I have examined the following specimens:

EL SALVADOR: Cerro de las Olla, *Calderón* 1020 (type). La Cebadilla, *Calderón* 1238. San Salvador, *Calderón* 1871.

Dioscorea, sect. *Arestophyton* Morton, sect. nov.

Subg. *Eudioscorea*. Caules dextrorsum volubiles; flores ♂ in cymis brevibus dispositi, longe pedicellati; stamina 3, filamentis longe ultra medium connata, antheris globosis, extrorsis, loculis distinctis; staminodia nulla; rudimentum stylinum in flore ♂ nullum; styli in columnam connati; capsulæ oblongæ. Species unica: *Dioscorea standleyi* Morton.

The section *Arestophyton* is most closely related to *Polyneuron*, which differs in having sinistrorsely climbing stems and distinct filaments.

***Dioscorea standleyi* Morton, sp. nov.**

Caules non fistulosi, herbacei, 2-3 mm. crassi, glabri, parce angulati; folia alterna, petiolata (petiolo 6-7 cm. longo, 1 mm. crasso), lamina ovata, papyracea, maxima 12 cm. longa et 10 cm. lata, basi cordata (sinu lato), apice acuminata, utrinque glabra, 9-nervata; inflorescentiæ ♂ axillares, solitariæ vel binæ, racemiformes, 14-15 cm. longæ, glabræ floribus in cymis brevibus 1-3-floris dispositis, pedunculis communibus 2-6 mm. longis, pedicellis 2-4 mm. longis, bracteis et bracteolis lineari-subulatis; perianthium ♂ glabrum, viride, segmentis lineari-oblongis, ca. 2 mm. longis et 0.5 mm. latis, margine disci hypogyni teneri insertis; stamina 3, filamentis ultra medium connata, antheris globosis, extrorsis, 2-loculatis, loculis distinctis, connectivis incrassatis; rudimentum stylinum nullum; inflorescentia ♀ racemosa, spiciformis, axillaris, solitaria, non ramosa, usque ad 11 cm. longa, floribus brevissime pedicellatis, bracteatis, bracteis lanceolatis; perianthium stipitatum, glabrum, segmentis lineari-oblongis, ca. 1.5 mm. longis; staminodia nulla; styli in columnam connati, 1 mm. longi, stigmatibus tribus brevissimis, distinctis; ovarium glabrum; capsulæ immaturæ rubescenti-virides, ca. 15 mm. longæ et 5 mm. latæ, acriter 3-angulatæ, glabræ; semina undique alata.

Type a staminate plant in the U. S. National Herbarium, No. 1,306,885, collected in wet forest at La Hondura, Prov. of San José, Costa Rica, altitude 1200-1500 meters, Mar. 9, 1926, by P. C. Standley and J. Valerio (No. 51877). I have seen the following additional specimens:

COSTA RICA: Yerba Buena, northeast of San Isidro, Prov. of Heredia, alt. about 2000 meters, *Standley & Valerio* 50158 (♀). La Palma, *Brade* (Herb. Inst. Nat. Costa Rica, No. 16328).

BOTANY OF THE MAYA AREA: MISCELLANEOUS PAPERS

XII

**A REVISION OF THE MEXICAN AND CENTRAL
AMERICAN SPECIES OF SMILAX**

By E. P. KILLIP and C. V. MORTON

[Issued July 10, 1936]

A REVISION OF THE MEXICAN AND CENTRAL AMERICAN SPECIES OF *SMILAX* ¹

The genus *Smilax* has been a favorite with authors and several admirable treatments have been published within the last hundred years. The species of the world were treated in 1850 by Kunth in the fifth volume of his *Enumeratio Plantarum*. In accuracy his descriptions have not been excelled, but they were mostly drawn from single specimens and consequently do not adequately indicate the range of variation which exists in various species. Most of his new species were based on minor and fluctuating characters and are now reduced to synonymy. The standard monograph of the genus is that of A. DeCandolle,² a work evidencing such painstaking care and ability that it will always remain the basis for future work on this genus. Being so comprehensive in scope it is not easy to use, especially in the absence of keys. Thomas Morong published an annotated list of the Mexican and Central American species in connection with his work on *Smilax* as represented in the United States. However, his list does not reflect a critical view of the genus, being essentially a compilation.

The West Indian species of *Smilax* have been treated exhaustively by Dr. O. E. Schulz, whose work seems eminently satisfactory. Dr. Schulz stresses in his key the articulation of the petioles. In *Smilax* the petiolar sheaths, together with the two tendrils borne at their apex, are persistent on the branches, the leaf blade at length disarticulating at a relatively constant point. In various species this point may be near the base (*i. e.* at the apex of the sheath), near the middle, or near the base of the blade itself. Although very likely of importance, little use has been made of this character in the present treatment, largely because of the difficulty encountered in determining it definitely. Furthermore, several species apparently vary in this respect.

The most recent treatment of the Mexican and Central American species is by Dr. F. W. Apt (*Repert. Sp. Nov. Fedde* 18: 385-422. 1922). Considering the few years which have since elapsed, it may be thought superfluous to present another, similar in scope. The treatment by Dr. Apt is, however, deficient in many respects. It was based almost solely on material in the Berlin Herbarium, which includes many specimens of historical importance (especially those studied by Kunth) but in which many species are inadequately represented. In the course of the present study we have examined probably more than ten times as many specimens. It is essential in this genus to examine as many as possible, not only because of marked variation in many of the species, but also because, owing to dioecism,

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²*Monogr. Phan.* 1: 1-213. 1878.

good fruits, staminate flowers, and pistillate flowers of a given species are likely not to be found in any one herbarium. Furthermore, it is essential to study the lower stems and leaves of each species, inasmuch as these frequently are different from those higher up on the plant and are usually present on only one sheet of a given collection.

The key given by Apt, being based largely on varying leaf and spine characters, is not very usable and frequently is inaccurate. The key being artificial, closely related species are often widely separated, and no adequate conception of their relationships can therefore be obtained. Also several errors of identification are to be found, as in the case of *S. panamensis*, which as treated by Apt is the same as *S. spinosa* Mill., the true *S. panamensis* Morong being redescribed as a new species, *S. ramonensis*. Similarly, *S. tomentosa* H.B.K. (which is, incidentally, ascribed to Kunth, 1850, and the type said to come from Santa Fé de Bogotá, New Mexico, instead of Colombia) is misidentified with an unrelated species of Costa Rica. A specimen of *S. pringlei* is erroneously identified with *S. mollis* var. *pavoniana* DC., the latter being raised to specific rank on the basis of this misidentification.

The nomenclature of Apt's treatment is also unsatisfactory in several instances as, for example, the recognition of *S. schlechtendalii* Kunth (1850), under which *S. lanceolata* L. (1753) and *S. domingensis* Willd. (1806) are reduced to synonymy. Some 10 or 12 species previously described from the area treated are not mentioned in any way; some of these antedate the names of species recognized.

In consideration of these and other errors, it seems desirable to present this new treatment, which is considerably more comprehensive and contains descriptions of all the species, complete synonymy, and citation of specimens. The descriptions in this paper of the wide-ranging species are drawn solely from the Mexican and Central American specimens and do not attempt to give the extralimital variations. Recent collections which we have studied contain a number of new species. Some of these are here published, but a larger number, represented by insufficient material, remain undescribed. Unfortunately, present rules of nomenclature require a change of name for several wide-spread species, including those of greatest economic importance.

No discussion is here given of general morphology. We could add but little to the admirable exposition by A. DeCandolle. The roots are not described, being for the most part unknown to us. Those of *S. aristolochiaefolia* and *S. regelii* are, or have been, extensively exported from Veracruz and Honduras, respectively, as a source of commercial sarsaparilla. A concoction of the roots of *S. moranensis* also is used in Mexico as a remedy for kidney trouble. The slender pliable stems of some species are used in basket-making. We have given the common names in use in different regions. These are probably more or less local. The general names given

to all the species throughout tropical America are "zarzaparilla," "zarza," and "zarzón."

We have had the privilege of studying collections of Mexican and Central American *Smilax* from numerous herbaria, to the curators of which we wish to express our deep gratitude. These are, with the abbreviations employed in citing specimens, as follows: B, Botanisches Museum, Berlin; BM, British Museum (Natural History); Boiss, Boissier Herbarium; Brux, Jardin de l'Etat, Brussels; F, Field Museum of Natural History; G, Gray Herbarium; Gen, Conservatoire et Jardin Botaniques, Geneva; K, Royal Botanic Gardens, Kew; Mich, University of Michigan; Mo, Missouri Botanical Garden; P, Muséum d'Histoire Naturelle, Paris; US, U. S. National Herbarium; V, Naturhistorisches Museum, Vienna; Y, New York Botanical Garden.

During the summer of 1935 the senior author had the advantage of studying the collections in many of the large herbaria of Europe. We have thus had access to almost all the types of species described from Mexico and Central America, most of which are now represented by photographs in the National Herbarium.

KEY TO SECTIONS

Plants entirely glabrous, often spiny; staminodia in pistillate flowers 3, 6, or 12.

Staminate flowers 2.8 mm. long or less. Peduncles shorter than the petioles.

Leaves with conspicuously reticulate secondary nerves, membranous or chartaceous or if coriaceous then very small, often acuminate on the nerves beneath; branchlets angular and often flexuous.....

I. SPINOSÆ

Leaves with obscure secondary nerves, coriaceous, large, unarmed; branchlets terete and straight.

Berries globose

II. LUNDELLIANÆ

Berries elongate, acute at either end.....

III. CONICIBACCATÆ

Staminate flowers 4 mm. long or more.

Peduncles of pistillate umbels shorter than the subtending petioles (occasional aberrant specimens of *S. jalapensis* and *S. vanilliodora* also exhibit this character); peduncles terete or, if angular, not flat. Stems terete; petioles articulate at or below the middle; leaves unarmed; anthers shorter than the filaments.

Staminodia in pistillate flowers 6; leaves large, coriaceous, with inconspicuous secondary veins; primary nerves prominently impressed above.....

IV. ENGLERIANÆ

Staminodia in pistillate flowers 3; leaves chartaceous, with conspicuously reticulate secondary veins; primary nerves elevated on both surfaces

V. LANCEOLATÆ

Peduncles of pistillate umbels longer than the petioles, almost always conspicuously flattened.

Anthers longer than the filaments. Staminodia 6 (3 in *S. vanilliodora*)

- Lower stems sharply or obtusely quadrangular; petiole articulate above the middle of the free part; lower leaves cordate or hastate at base (or merely rounded in *S. vanilliodora*), often aculeate VI. MEDICÆ
- Lower stems perfectly terete; petiole articulate below the middle of the free part; leaves all acute at base, unarmed..... VII. PANAMENSES
- Anthers shorter than the filaments. Petioles articulate at or below the middle; leaves not aculeate (except in *S. bona-nox*).
Staminodia in pistillate flowers 12, two opposite each perianth segment; leaves glaucous beneath VIII. GLAUCÆ
- Staminodia 3 or 6; leaves not glaucous beneath.... IX. HISPIDÆ
- Plants hairy, in some species glabrate at maturity but then at least a few hairs persistent on the petioles, peduncles, or pedicels, always unarmed; staminodia 3, except in *S. subpubescens*. Anthers shorter than the filaments X. MOLLES

KEY TO SPECIES

I. SPINOSÆ

- Leaf margins unarmed; stem (and often leaves) bearing large spines 1. *S. spinosa*
- Leaf margins spinulose; stems and leaves bearing numerous setiform spinules 1a. *S. spinosa* var. *compta*

II. LUNDELLIANÆ

- A single species 2. *S. lundellii*

III. CONICIBACCATÆ

- A single species 3. *S. munda*

IV. ENGLERIANÆ

- A single species 4. *S. engleriana*

V. LANCEOLATÆ

- Leaves 5-nerved, the outer nerves submarginal.
Stems verrucose, with numerous short spines; upper leaves narrowly lanceolate..... 5. *S. microscola*
- Stems smooth, unarmed or in the lower part sparingly armed with large spines; upper leaves ovate-lanceolate 6. *S. lanceolata*
- Leaves 7-nerved, the outer nerves submarginal..... 7. *S. kunthii*

VI. MEDICÆ

- Berries red.
Perianth segments 3.5-4 mm. long; staminodia in pistillate flowers 6; lower stems obtusely quadrangular, the upper subterete..... 8. *S. aristolochiæfolia*
- Perianth segments 8-10 mm. long; staminodia 3; all stems sharply quadrangular..... 9. *S. vanilliodora*
- Berries black (or white in the variety); stems all sharply quadrangular. Perianth segments 3.5-5 mm. long..... 10. *S. regelii*

VII. PANAMENSES

- Staminate flowers sessile; staminate umbels solitary, axillary, long-peduncled; leaves 5-nerved (the outer nerves marginal), the secondary veins parallel.....11. *S. spissa*
 Staminate flowers obviously pedicellate; staminate umbels borne in short, bracteate, raceme-like branchlets; leaves 7-nerved (the outer nerves marginal), the secondary veins prominently reticulate.....12. *S. panamensis*

VIII. GLAUCÆ

- A single species.....13. *S. glauca*

IX. HISPIDÆ

- Leaves deltoid or cordate in outline, often slightly 3-lobed, the margins and the nerves beneath often spiny.....14. *S. bona-nox*
 Leaves ovate or ovate-lanceolate, not at all lobed (except sometimes in *S. moranensis*), never spiny.
 Branchlets terete or irregularly subangulate.
 Leaves pale green when dry, acute or obtuse at base, often slightly lobed, the margins minutely erose-denticulate; species of Mexican plateau.....15. *S. moranensis*
 Leaves drying blackish, never lobed, the lower ones often subcordate at base; margins smooth; species of Guatemala and the Atlantic slope of Mexico16. *S. jalapensis*
 Branchlets quadrangular.
 Leaves drying blackish, 7-nerved, the larger often subcordate at base. Mexico and Guatemala.....16a. *S. jalapensis* var. *botteri*
 Leaves pale green when dry, 5-nerved, never subcordate at base. Costa Rica.....17. *S. standleyi*

X. MOLLES

- Branchlets obtusely quadrangular, glabrate at maturity; staminodia 6. Inflorescence and young growth red-tomentose; peduncles shorter than the subtending petioles; leaves glabrate at maturity.....18. *S. subpubescens*
 Branchlets terete (except the lowermost), usually hairy even at maturity (glabrate in *S. pringlei* and *S. purpusii*); staminodia 3.
 Leaves broadly deltoid, glabrate at maturity, long-petiolate, the petioles often two-thirds as long as the blades. Peduncles usually shorter than the subtending petioles, rarely a little longer.....19. *S. purpusii*
 Leaves not deltoid, relatively narrower, at least some hairs persistent beneath on the principal veins, shorter-petiolate.
 Stems densely lanate-tomentose. Leaves densely tomentose beneath, triplinerved.....20. *S. velutina*
 Stems pilose, glabrate, or (in *S. gymnopoda* and *S. mollis*) subtomentose, but the hairs then coarser, less densely matted, and at least partly spreading.
 Peduncles of fruiting umbels only 1-3 mm. long.
 Leaves triplinerved21. *S. candelariæ*
 Peduncles of fruiting umbels much longer, exceeding the subtending petiole in length (except sometimes in *S. mollis* var. *acuminata*).

- Perianth segments 6.5-9 mm. long, uniformly short-hairy externally, lacking an apical tuft of hairs; leaves usually triplinerved.
- Leaves at maturity glabrous, except for the long-pilose principal nerves; stems glabrous at maturity; staminate flowers 6.5-7 mm. long 22. *S. pringlei*
- Leaves persistently pilosulous beneath; stems subtomentose; staminate flowers 8-9 mm. long 23. *S. angustiflora*
- Perianth segments 4-5 mm. long (or 6 mm. in *S. mollis* var. *hirsutior*), glabrous (or sometimes with a few scattered hairs externally) except for an apical tuft of long hairs; leaf nerves all basal.
- Leaves acuminate, subtomentose beneath 24. *S. gymnopoda*
- Leaves acute, merely pilosulous beneath or glabrate.
- Leaves pilosulous beneath; peduncles longer than the subtending petioles.
- Leaves and stems short-hirsute; ♂ flowers 4-5 mm. long 25. *S. mollis*
- Leaves and stems long-hirsute; ♂ flowers 5-6 mm. long 25b. *S. mollis* var. *hirsutior*
- Leaves glabrous beneath except on the principal nerves; peduncles often shorter than the subtending petioles 25a. *S. mollis* var. *acuminata*

1. *Smilax spinosa* Mill. Gard. Dict. ed. 8, No. 8. 1768.

PLATE 1.

- Smilax houstoniana* Steud. Nom. ed. 2, 2: 599. 1841. A new name given to *S. spinosa* Mill., non Poir. (1804). Miller's name has, of course, priority over that of Poir.
- Smilax obtusa* Benth. Bot. Voy. Sulph. 175. 1844. Type collected by Beechey at Manzanilla Bay, Colima, Mexico. It represents the form with small coriaceous leaves, common on the Pacific slope of Mexico.
- Smilax mexicana* Griseb. ex Kunth; Enum. 5: 167. 1850. Type in the Berlin Herbarium, collected near Misantla, Veracruz, Mexico, by Schiede & Deppe (No. 986).
- Smilax costarica* Vatke, Linnæa 40: 223. 1876. Founded on specimens collected by C. Hoffmann (Nos. 504 ♂ and 503 ♀) at San José, Costa Rica in May, 1857. These specimens represent a common form of the species occurring from Mexico to South America.
- Smilax mexicana* var. *costarica* A. DC. Monogr. Phan. 1: 117. 1878. Founded on *S. costarica* Vatke.
- Smilax wagneriana* A. DC. op. cit. 143. Type collected in the province of Chiriquí, Panama, by M. Wagner. It appears, from study of a photograph, to be the common Central American form of *S. spinosa*.
- Smilax mazatlanensis* Sessé & Moc. Plant. Nov. Hisp. ed. 2, 159. 1893. Described from "Mazatlán," which according to Sprague (Kew Bull. 1926: 422. 1926) is not the well-known seaport of that name in Sinaloa but a small village in Guerrero. The description, though short, sufficiently identifies the species with *S. spinosa*.
- Smilax gaumeri* Millsp. Field Mus. Bot. 1: 357. 1898. Type collected in Yucatan by Gaumer (No. 687 ♀).

Stems armed with stout spines or unarmed, the lower subterete, often slightly verrucose, the upper usually 4 to 6-angled, often flexuous; petioles short, rarely more than 1 cm. long, aculeate or unarmed, the free part usually articulate near the middle, but often either above or below the middle; lower leaf blades ovate or broadly elliptic, up to 14 cm. long and 8 cm. wide (but usually much smaller), acute or rounded and mucronate at apex, subcordate at base, the upper leaves smaller, lanceolate, narrowly elliptic, or

oval, acute or rounded at apex, acute at base, membranous, chartaceous, or coriaceous, concolorous, glabrous, entire, not lobed, often aculeate on the principal nerves beneath, 5-nerved, the nerves and prominently reticulate secondary veins elevated on both surfaces; peduncles of ♂ umbels solitary in the axils, up to 8 mm. long, shorter than the subtending petioles, flattened; receptacle globose or ellipsoid, the bracteoles numerous, in several series at the base of the pedicels, acuminate or acute or a few rounded, entire or denticulate; pedicels capillary, 5 to 13 mm. long, longer than the peduncle; perianth segments ovate-oblong or oblong, minute, 2.8 mm. long or less, 1 to 1.4 mm. wide, slightly unequal, spreading; stamens about 1.6 mm. long, the filaments fleshy, shorter or longer than the anthers; peduncles of ♀ umbels solitary, up to 9 mm. long, shorter than the subtending petiole, obviously flattened; pedicels 5 to 9 mm. long, usually exceeding the peduncle, sometimes glaucescent; perianth segments oblong or oblong-lanceolate, 1.5 to 2.8 mm. long, recurved, the outer larger than the inner; staminodia 3 or 6, minute, subulate; styles 3; berries black, globose, varying greatly in size, 4 to 12 mm. in diameter.

Type collected in Veracruz by Houston.

RANGE: Tropical region of both coasts of Mexico and throughout Central America, ascending in Costa Rica to an altitude of 2000 meters.

Specimens examined:

MEXICO: Gregg 1129 (Mo).

TAMAULIPAS: Tampico, *Berlandier* 204 (Gen); *Palmer* in 1910 (G, US).

SINALOA: Mazatlán, *Rose, Standley, & Russell* 14017 (US, Y). Villa Unión, *Rose, Standley, & Russell* 13882 (US, Y).

NAYARIT: San Blas, *Barclay* 1156 (BM); *Nelson* 4337 (G, US); *Ferris* 5325 (US). Acaponeta, *Rose* 1512 (US, Y), 14324 (US, Y).

VERACRUZ: Valle de Córdoba, *Bourgeau* 1486 (Boiss, Brux, G, K, P, US), 1784 (K, P), 2329 in part (K, P). Orizaba, *Bourgeau* 2445 (Gen, K, P); *Botteri* (G). Tantoyuca, Huasteca, *Ervendberg* 363 (G, K). Atoyac, *Kerber* 429 (US). Papantla, *Liebmann* 14666 (F). Veracruz, *Müller* in 1853 (Y). Tezonapa, *Orcutt* 3118 (F, Mo). Misantla, *Schiede & Deppe* 986 (B, type of *S. mexicana*, K, V).

COLIMA: Manzanilla Bay, *Beechey* (Gen, fragment, K, type of *S. obtusa*).

GUERRERO: Acapulco, *Palmer* 516 (F, G, K, Mo, US, Y).

OAXACA: Rincón Antonio, *Orcutt* 3231 (F, Mo).

TABASCO: Atasta, *Rovirosa* 505 (K, US).

CHIAPAS: Monserrate, *Purpus* 10027 (US), 10028 (Y).

YUCATAN: *Gaumer* 687 (Boiss, F, type of *S. gaumeri*, Mo, US, Y), 23940 (F, Mo, US), 24226 (F, US).

BRITISH HONDURAS: Cocquericot, El Cayo District, *Bartlett* 12060 (Mich). Little Cocquericot, Belize River, *Lundell* 4436 (Mich). Jacinto Creek, *Schipp* 582 (F).

GUATEMALA: La Libertad, Petén, *Lundell* 2259 (Mich), 2270 (Mich), 2337 (Mich), 3466 (US), 3536 (G, US); *Aguilar* 257 (Mich). Acatepeque, Zacatepequez, *J. D. Smith* 2791 (K, US). Quiriguá, *Standley* 23940 (G, Mo, US), 24506 (G, US, Y). Zacapa, *Kellerman* 7763 (Y).

HONDURAS: San Pedro Sula, *Bangham* 343 (F).

EL SALVADOR: Department of San Salvador, *Standley* 20504 (G, US), 22647 (G, US), 23321 (G, US), 23577 (G, US); *Calderón* 1128 (G, US, Y). Ahuachapán, *Standley* 19798 (G, Mo, US). Apastepeque, *Standley* 21351 (G, US, Y). Department of Sonsonate, *Standley* 21833 (G, US, Y), 23456

(G, US, Y). La Unión, *Standley* 20683 (G, US, Y). San Martín, *Calderón* 697 (G, Mo, US, Y).

NICARAGUA: Segovia, *Oersted* 14671 (US).

COSTA RICA: Tilarán, *Standley & Valerio* 45693 (US), 45732 (F, US). El Coyolar, *Standley* 40060 (US). Limón, *Pittier* 16038 (BM, G, US). San Isidro, *Standley & Valerio* 50218 (US). San José, *Hoffmann* 503 (B, type of *S. costaricæ* ♀), 504 (B, type of *S. costaricæ* ♂); *Tonduz* 7325 (US), 7993 (G, Gen, US); *Standley* 33277 (US), 47359 (US). Zapote, *Standley* 40245 (US). Cerro de la Carpintera, *Standley* 34515 (US). Volcán de Poás, *Standley* 34653 (US). Nicoya, *Tonduz* 13725 (BM, US), 13984 (B, US). Aguacaliente, *Stork* 1337 (F, Mich); *Lankester* K74 (K). Buenos Aires, *Valerio* 896 (F).

PANAMA: Chiriquí, *Wagner* 630 (F, photograph of type of *S. wagneriana* in Münich Herbarium). Penonome, *Williams* 241 (US, Y). Gatun, *Hayes* 273 (Y). Fort Lorenzo, *Piper* 5954 (US). Province of Panama, *Hayes* in 1862 (BM); *Maxon & Harvey* 6622 (US); *Standley* 26306 (US), 26670 (US), 31872 (US).

Local names: "Bejuco de corona"; "zarza hueca"; "espuela de gallo" (El Salvador).

Although we have not seen the type, the description by Miller leaves no doubt that, of the species known from Veracruz, only the present could be intended.

Smilax spinosa is the most variable species known in the genus. Almost all the characters by which species of *Smilax* may ordinarily be distinguished seem to be of little importance in this. Thus, the anthers may be either longer or shorter than the filaments, the pedicels longer or shorter than the peduncles, and the petioles articulate either above or below the middle. The leaves also vary exceptionally in size and texture, being in some specimens thin-membranous and deciduous, in others coriaceous and persistent. Nevertheless, in spite of this variability, *S. spinosa* is one of the most easily recognized species in the genus by reason of its minute flowers, angular spiny stems, reticulate, often aculeate leaves, and short peduncles.

1a. *Smilax spinosa* var. *compta* Killip & Morton, var. nov.

Caules teretes, asperrimi (spinulis minutissimis numerosis), caulibus inferioribus aculeis paucis rectis compressis armatis, superioribus inermibus; petioli 5-8 mm. longi, partis liberæ setulosæ juxta basin articulati; folia decidua, lamina elliptica vel elliptico-lanceolata, usque ad 10 cm. longa et 3.2 cm. lata, membranacea, apice acuminata, basi acuta, supra glaberrima, subtus glabra sed venis setulis flaccidis longis numerosis armata, margine spinulosa, 5-nervia, nervis utrinque elevatis; pedunculus ♂ umbellarum 4-10 mm. longus, petiolum æquans vel superans, valde compressus, setulosus; receptaculum 3-4 mm. diametro, globosum, pedicellis geminis basi bracteolis nonnullis deltoideis vel semicupuliformibus rotundatis glanduloso-fimbriatis cinctis, bracteolis exterioribus umbellarum lanceolatis acuminatis glabris; pedicelli numerosi, 6-8 mm. longi, capillares, glabri, inermes; perianthii segmenta glabra, 1.7-2 mm. longa, patentia, exteriora quam interi-

ora paullo longiora latioraque; stamina minuta, divergentia, ca. 1 mm. longa, antheris filamenta æquantibus; flores feminei et fructus non suppetunt.

Type in the U. S. National Herbarium, No. 678,534, collected on dry limestone in forests around Alhájuela, Chagres Valley, Province of Panama, altitude 30 to 100 meters, May 12-15, 1911, by H. Pittier (No. 3487 ♂).

Differs from the typical variety in the numerous small setiform spinules covering the branchlets and leaves.

2. *Smilax lundellii* Killip & Morton, sp. nov.

PLATE 2.

Caules inferiores ignoti, superiores tenues, teretes, recti, leviter striati, inermes; petioli 1-2 cm. longi, glabri, supra medium partis liberæ articulati; lamina foliorum oblongo-lanceolata vel lanceolata, maxime 14.5 cm. longa et 5.6 cm. lata, apice acuta, basi obtusa vel acuta, papyracea, concolor, glabra, inermis, integra, non lobata, 5-nervia, nervis et venis secundariis valde reticulatis supra elevatis; pedunculi umbellarum ♂ solitarii vel in racemis bracteatis dispositi, 3-10 mm. longi, paullo compressi, glabri; receptaculum hemisphæricum, ca. 3 mm. diametro, bracteis minutissimis, persistentibus, fimbriatis; pedicelli graciles, usque ad 1 cm. longi, pedunculo paullo longiores vel subæquales; perianthii segmenta viridia, ovalia, 2 mm. longa et 0.8 mm. lata, patentia; filamenta crassa, divaricata, ca. 0.8 mm. longa; antheræ filamentis breviores, ca. 0.5 mm. longæ, tenues, recurvatæ; flores ♀ desunt; pedunculi fructiferi 5-11 mm. longi, petiolo multo breviores, compressi; receptaculum 4 mm. diametro, bracteis minutissimis; pedicelli 7-10 mm. longi, pedunculo longiores, basi bulboso-inflati, apice incrassati, disciformes; baccæ globosæ, 4-6 mm. diametro.

Type in the U. S. National Herbarium, No. 1,585,744, collected at Sabana Zis, District of Petén, Guatemala, May 3, 1933, by C. L. Lundell (No. 3190 ♂). Duplicate at University of Michigan.

RANGE: Yucatan peninsula, near sea-level.

Other specimens examined:

BRITISH HONDURAS: Stann Creek, *Schipp* 509 ♀ (F, G, K, Mich, Mo, Y).

3. *Smilax munda* Killip & Morton, sp. nov.

PLATE 3.

Caules inferiores teretes, glabri, striati, aculeis paucis compressis fere rectis armati, ramuli angulati, inermes; petioli usque ad 3 cm. longi, inermes, partis liberæ supra medium articulati; laminæ foliorum majorum ovato-lanceolatae, usque ad 17 cm. longæ et 9.2 cm. latæ, apice acutæ, basi cordatæ et complicatæ, laminæ foliorum superiorum multo minores, oblongæ vel anguste ellipticæ, basi acutæ, omniæ coriaceæ, glabræ, inermes, integræ, non lobatæ, 5-nerviæ, nervis extimis sæpe submarginalibus, nervis utrinque paullo elevatis, venis secundariis inconspicuis; flores ♂ ignoti; pedunculus ♀ umbellarum 4-7 mm. longus, solitarius, axillaris, petiolo brevior, glaber, compressus; receptaculum globosum, 2-3 mm. diametro, bracteis numerosis minutissimis obtusiusculis glanduloso-denticulatis præditum; pedicelli 5-8 mm. longi, graciles, pedunculo longiores; perianthii segmenta viridia, minuta, 1-2 mm. longa, segmentis exterioribus ovato-oblongis, interioribus minoribus, oblongis; staminodia 3, minuta, subulata; pedunculus fructiferus usque ad 1 cm. longus; pedicelli gracillimi, usque ad 1.3 cm. longi, apice gradatim valde incrassati; perianthii segmenta persistentia, patula; baccæ

primo rubræ, demum nigræ, ellipticæ, usque ad 1.7 cm. longæ, 5-7 mm. latæ, apice et basi angustatæ, acutæ.

Type in the Field Museum, No. 683,585, collected on the bank of the Río Grande, British Honduras, July 23, 1933, by W. A. Schipp (No. 1181 ♀). Duplicate at K, Mich, Mo.

RANGE: Yucatan peninsula, near sea-level.

Other specimens examined:

BRITISH HONDURAS: Duck Run, El Cayo District, *Bartlett* 12980 ♀ (Mich, US). Temash River, *Smart & Stevenson* 113 ♀ (F).

Local name: "Tietie."

According to Mr. Schipp, this is a very large vine reaching 60 feet in length and one-half inch in diameter near the base. In its elongate fruits, acute at either end, this species is very dissimilar to any other with which we are familiar.

4. *Smilax engleriana* Apt, Repert. Sp. Nov. Fedde 18: 407. 1922.

Smilax canaliculata Apt, *op. cit.* 406. The type specimen is not absolutely identical with the specimens of *S. engleriana*, but in the absence of flowers no distinguishing characters can be made out.

Stems terete, glabrous, striate, sparingly armed with short, slightly curved, flattened spines; petioles up to 2.3 cm. long, the free part articulate at the middle; leaf blades lanceolate, the larger about 15 cm. long and 5 cm. wide, acuminate at apex, acute at base, coriaceous, glabrous, unarmed, entire, not lobed, 5-nerved, the outer nerves submarginal and inconspicuous, the three inner nerves deeply impressed above, elevated beneath, the secondary veins obscure on both surfaces; peduncles of ♂ umbels solitary, axillary, not more than 6 mm. long, shorter than the subtending petioles, glabrous, angular; receptacle subglobose, large, about 4 mm. in diameter, the bractlets short, obtuse, ciliate, persistent; pedicels slender, 5 to 7 mm. long, slightly exceeding the peduncle in length; buds oblanceolate, narrowed toward base; perianth segments ligulate, about 6 mm. long; filaments fleshy, about 2.5 mm. long, the anthers shorter, about 2 mm. long; peduncles of ♀ umbels solitary, axillary, up to 6 mm. long, much shorter than the subtending petiole, obviously flattened; bracts of the receptacle short, acutish, ciliate; flowers numerous, the pedicels 6 to 8 mm. long; perianth segments broadly lanceolate, about 4 mm. long, recurved; staminodia 6, subulate, about 1 mm. long; ovary rugose; styles 3, about 1.2 mm. long; fruiting pedicels slender, up to 15 mm. long, bulbous-thickened at base, sulcate, enlarged and disk-shaped at apex; berries red, globose, 6 to 9 mm. in diameter.

RANGE: Costa Rica, at altitudes from 700 to 1800 meters.

Specimens examined:

COSTA RICA: *Stork* 1092 ♀ (F). Santa Rosa del Copey, alt. 1100 meters, *Tonduz* 11732 ♂, in part (B, type, BM, US, V). Las Vueltas, Tucurrique, 700-800 meters, *Tonduz* 13303 ♀ (B, type of *S. canaliculata*, BM, Gen, K, US). Rio Navarreto, *Pittier* 2381 ♀ (B, BM, US). Cartago, *Stork* 561 (US); *Lankester* K193 (K). Aguacaliente, *Stork* 1310 ♀ (F, Mich).

The reddish spots mentioned by Apt as occurring on the under surface of the leaves are present in all the specimens cited except *Tonduz* 13303, the type of *S. canaliculata*.

5. *Smilax microscola* (Rob.) Killip & Morton, comb. nov.

Smilax domingensis var. *microscola* Rob. Proc. Amer. Acad. 35: 323. 1900.

Stems terete, glabrous, the lower verrucose, conspicuously armed with short (about 1 mm. long), straight, broad-based spines, the branchlets quite smooth, unarmed, or with a few, scattered, small spines; petioles up to 2.5 cm. long, the tendrils not well developed, the free part of the petiole articulate at the middle; lower leaf blades ovate-lanceolate, about 15 cm. long and 7.5 cm. wide, short-acuminate at apex, obtuse at base, the upper leaves lanceolate, smaller, long-acuminate at apex, acute at base, papyraceous, shining above, dull beneath, glabrous, entire, not lobed, unarmed, 5-nerved, the outer nerves strictly marginal in the upper leaves, the nerves and prominently reticulate secondary veins elevated above; peduncles of ♂ umbel about 3 mm. long or less, very much shorter than the subtending petiole, stout, angular; receptacle large, globose, about 4.5 mm. in diameter, the bracts very small, obtuse; pedicels up to 1 cm. long, slender, glabrous; perianth segments ligulate, 9 mm. long and 1.7 mm. wide, spreading, glabrous; filaments erect, about 6 mm. long, the anthers very short, 1.7 to 2 mm. long; pistillate flowers not seen; fruiting peduncle very short, only about 1.5 mm. long, angular; receptacle globose, 3 to 4 mm. in diameter, the short, acuminate bracts persistent, glandulose-denticulate; pedicels about 7 mm. long, slender, straight, not bulbous at base; berries 5 to 7 mm. in diameter, globose.

RANGE: Oaxaca and Chiapas, at altitudes between 1000 and 1800 meters.

Specimens examined:

OAXACA: Juquila District, *Conzatti* 2531 ♀ (F, US).

CHIAPAS: Between Tumbala and El Salto, *Nelson* 3392 ♂ (G, type, US).

The elongate leaves and verrucose branches armed with numerous short spines distinguish this species satisfactorily from *S. lanceolata*.

6. *Smilax lanceolata* L. Sp. Pl. 1031. 1753.

Smilax domingensis Willd. Sp. Pl. 4: 783. 1806. Type collected in Santo Domingo by Richard.

Smilax schlechtendalii Kunth, Enum. 5: 224. 1850. Type in the Berlin Herbarium, collected at Misantla, Veracruz, Mexico, by Schiede and Deppe.

Smilax schlechtendalii var. *lindenii* A. DC. Monogr. Phan. 1: 102. 1878.

Lower stems terete, smooth, striate, glabrous, sparingly armed with stout recurved spines 5 to 6 mm. long, the upper stems smooth, terete, unarmed; petioles short, up to 1.6 cm. long, articulate at about the middle of the free part; leaf blades ovate-lanceolate or ovate, usually not more than 9 cm. long and 5 cm. broad, but rarely up to 15 cm. long and 7 cm. broad, chartaceous, dark green and shining above, paler and dull beneath, abruptly acuminate at apex, acute at base, entire, not lobed, glabrous, unarmed, 5-nerved, the outer nerves usually submarginal, the nerves and conspicuously reticulate secondary veins elevated on both surfaces; peduncles of ♂ umbels solitary or in short, bracteate, axillary branchlets, 1 to 5 mm. long, much shorter than the subtending petiole, glabrous, slightly flattened; receptacle globose, about 4 mm. in diameter, the bracteoles glandular-fimbriate, forming a deep cup 1 mm. high at the base of each pedicel, the inner bracteole curved almost cylindrically, rounded at apex, the outer ones broadly deltoid, obtuse or acute; pedicels slender, 4 to 7 mm. long; perianth segments

ligulate, 4.5 to 6.5 mm. long, 1.2 to 1.5 mm. wide, glabrous, acute, recurved; filaments 3 to 4 mm. long, the anthers much shorter, 1.2 to 2 mm. long; peduncles of ♀ umbels subterete, up to 7 mm. long, much shorter than the subtending petioles; pistillate receptacle similar to the staminate; pedicels 4 to 7 mm. long, longer than the peduncle; perianth segments oblong-lanceolate, about 4 mm. long; staminodia 3, subulate, about 1 mm. long; styles 3, 1 to 1.5 mm. long; fruiting pedicels 4 to 10 mm. long, slightly enlarged at base; fruits dull-red or brown, globose, 5 to 10 mm. in diameter.

RANGE: Tropical eastern Mexico and throughout Central America, from sea-level to 1200 meters elevation.

Specimens examined:

MEXICO: *Sartorius* (B); *Schaffner* 178 (B); Passo Mayo, *Wawra* 890 (V).

VERACRUZ: *Schiede & Deppe* in 1828 (BM). Misantla, *Schiede & Deppe* 987 ♀ (B, type of *S. schlechtendalii*, K, V). Fortín, *Kerber* 361 (B, BM, Boiss, Gen, K, US, V). Orizaba, *Botteri* 399 (G, US), 453 (G, US), 970 (Boiss, Gen, K, P, V), 1326 (B), 1851 (B); *Bourgeau* 3256 (K, P); *Müller* 991 (V, Y). Mirador, *Linden* 50 ♀ (Boiss, type of *S. schlechtendalii* var. *lindenii*, Gen, K); *Galeotti* 7082 (B, Brux, Gen, K, P, US, V); *Liebmann* 14658 (F, US), 14659 (F), 14659a (F). Medellín, *Wawra* 8 (V). Córdoba, *Seaton* 401 (F, G, US). Huatusco, *Müller* 413 (Y). Zacupán, *Purpus* 7513 (G, Mo, US, Y), in 1917 (B). Jalapa, *Pringle* 7780 (F, G, K, Mo, Y). Coatzacoalcas, *C. L. Smith* 1109 (US).

OAXACA: Cafetal Concordia, *Morton & Makrinius* 2438 (US). Cerro Espiño, *Reko* 3434 (US).

TABASCO: Tamulte, *Rovirosa* 611 (K, US).

BRITISH HONDURAS: *Schipp* 501 (F). Sibun River, *Bartlett* 11359 (Mich, US). Maskall Pine Ridge, *Gentle* 1134 (Mo, US). Mullins River Road, *Schipp* 836 (F, G, Mich, Mo, Y). Stann Creek, *Kinloch* 211 (F).

GUATEMALA: Los Amates, Izabal, *Kellerman* 7107 (F). Escuintla, *Hayes* in 1860 (F, G, US).

HONDURAS: Puerto Sierra, *Wilson* 622 (F, G, US, Y). Meambar, *Niederlein* in 1898 (B).

EL SALVADOR: Santa Tecla, La Libertad, *Standley* 23036 (US); *Calderón* 1558 (US).

COSTA RICA: Escasú, San José, *Standley* 32512 (US).

PANAMA: Aspinwall, *Hayes* 638 (BM). Juan Díaz, Province of Panama, *Standley* 30633 (US).

Local names: "Cocol-mecata"; "olioca" (Mexico); "China root" (British Honduras); "diente de perro" (Honduras); "bejuco de canasta" (Costa Rica); "chiquihuiti."

Although the Mexican form of this species has been known as *S. schlechtendalii*, the West Indian as *S. domingensis*, and the United States plant as *S. lanceolata*, it was suggested long ago by A. DeCandolle that they were but forms of a single species. O. E. Schulz reduced *S. schlechtendalii* to the synonymy of *S. domingensis*, but retained *S. lanceolata* as a valid, closely related species. Apt definitely states that he considers all three synonymous, yet he uses the name *S. schlechtendalii* Kunth (1850), reducing the Linnæan species to synonymy.

The distinctions adduced by Schulz to maintain *S. domingensis* as distinct from *S. lanceolata* are inconstant and of little significance in the light of the abundant material now available from all three centers of distribution.

7. *Smilax kunthii* Killip & Morton, nom. nov.

Smilax floribunda Kunth, Enum. 5: 229. 1850, non Hamilt. 1825.

Stems terete, smooth, finely striate, sparingly armed with short, straight, flat spines; petiole up to 3 cm. long, deeply sulcate above, articulate at or below the middle of the free part; leaf blades ovate, the larger 12 cm. long and 8 cm. wide, short-acuminate at apex, the larger rounded or subcordate and complicate at base, glabrous, unarmed, entire, not lobed, chartaceous, deep-green and shining above, paler beneath, 7-nerved, the outer nerves submarginal, the nerves and prominently reticulate secondary veins elevated on both surfaces; peduncles of ♂ umbels 3 to 13 mm. long, subterete, solitary or in short bracteate raceme-like branchlets; receptacle globose, large (about 4 mm. in diameter), the bracteoles forming a deep cup at the base of each pedicel, glabrous and entire, or sparingly glandular-denticulate, the inner bracteole almost cylindric, rounded, the outer ones broadly deltoid, acute or short-acuminate, all becoming indurate in age; pedicels 5 to 7 mm. long, varying from shorter to longer than the peduncles; perianth segments lanceolate, 4.5 to 5 mm. long, recurved; filaments 2.5 to 3 mm. long, the anthers much shorter, about 1.75 mm. long; pistillate flowers not known; fruiting peduncles terete, up to 2 cm. long, shorter than the subtending petioles; receptacles as in the staminate umbels; pedicels 7 to 9 mm. long, slightly thickened at base; berries globose, green (according to notes on South American specimens).

Type collected by Hartweg in Ecuador ["Peru" in error].

RANGE: Mountains of Costa Rica, at altitudes from 1200 to 2400 meters, and Andes of South America.

Specimens examined:

COSTA RICA: Aguacaliente, Pittier 2380 (US). San Isidro, Heredia, Standley & Valerio 49038 (F, US), 50770 (US). La Palma, San José, Jiménez 938 (US); Standley 33154 (US).

Local name: "Pútarra" (Costa Rica).

Closely related to *S. lanceolata*, but differing in having 7-nerved leaves. The leaves of *S. lanceolata*, although variable enough, are constantly 5-nerved. The fruiting peduncles of *S. kunthii* are usually much longer than those of *S. lanceolata*. Specimens from Costa Rica do not seem to differ essentially from South American material.

8. *Smilax aristolochiæfolia* Mill. Gard. Dict. ed. 8, No. 7. 1768.

Smilax medica Schlecht. & Cham. Linnæa 6: 47. 1831. Specimens of the type collection in the Berlin Herbarium (*Schiede & Deppe* 985, from Papantla, Veracruz, Mexico) have been examined.

Smilax milleri Steud. Nom. ed. 2, 2: 599. 1841. A new name given to *S. aristolochiæfolia* Mill., non Willd. (Sp. Pl. 4: 786. 1806). Miller's name, of course, has priority by many years.

Smilax ornata Lem. Ill. Hort. 12: pl. 439. 1865. Founded on cultivated plants received from Mexico from Ghiesbreght. This species has commonly been identified with the plant here called *Smilax regelii*, but, as pointed out by Hooker, Hemsley, and Apt, it can scarcely be the same. From Lemaire's description there seems little doubt that the plant collected by Ghiesbreght was *S. aristolochiæfolia*. Incidentally, leaves of *S. aristolochiæfolia* variegated similarly to those figured by Lemaire have been collected in British Honduras by Bartlett (No. 12010).

Smilax medica var. *bracteata* A. DC. Monogr. Phan. 1: 87. 1878. Founded on a specimen in the Kew Herbarium collected by Ervendberg (No. 336) in the province of Huasteca, Veracruz, Mexico. It does not differ from typical specimens of *S. aristolochiæfolia*.

Smilax kerberi Apt, Repert. Sp. Nov. Fedde 18: 408. 1922. Founded on Mexican material collected by Kerber (No. 236, without locality) in the Berlin Herbarium. The two specimens bear foliage only and seem not to differ from other material of *S. aristolochiæfolia*, except that the leaves are slightly narrower than usual and have more widely flaring basal lobes.

Lower stems obtusely quadrangular, pale yellowish green, striate, smooth or verrucose, armed with large, flat, slightly curved spines up to 1.3 cm. long, the upper stems obtusely quadrangular or subterete, pallid, smooth or slightly verrucose, sparsely armed, or unarmed; petioles up to 5 cm. long, stout, spiny or unarmed, the free part articulate above the middle; lower leaf blades ovate to oblong, up to 28 cm. long and 14 cm. wide, rounded and mucronate at apex, deeply cordate or hastate at base, often more or less lobed toward the base, usually armed on the midrib and principal nerves with stout, yellowish spines, the upper leaf blades much smaller, not lobed, open-cordate at base (or sometimes the reduced leaves of flowering branchlets merely obtuse), all pale yellowish green, thick-chartaceous, entire, glabrous, 7-nerved (the outer nerves visible near the base only), the nerves and reticulate secondary veins elevated on both surfaces; peduncles of ♂ umbels solitary and axillary, or borne on short bracteate branchlets, up to 3.5 cm. long, much exceeding the subtending petioles, slender, glabrous, unarmed, slightly flattened; receptacle 2 to 2.5 mm. broad, the bracteoles at the base of the pedicels forming a low fleshy cup, indurate in age, the tips acute, glabrous; pedicels numerous, 5 to 11 mm. long, much shorter than the peduncle, very slender, glabrous; perianth segments oblong, about 4 mm. long and 1.3 to 1.8 mm. wide, rounded or acutish at apex, spreading, glabrous; filaments fleshy, 1 to 1.3 mm. long, the anthers exceeding the filaments, 1.7 to 2 mm. long; peduncle of ♀ umbel up to 2.2 cm. long, much exceeding the subtending petiole, obviously flattened; pedicels up to 8 mm. long, very slender; perianth segments oblong, about 3.5 mm. long and 1.5 mm. wide; staminodia 6, those of the inner series appreciably smaller than the outer; styles 3, recurved, about 1 mm. long; fruiting peduncles up to 4 cm. long, thick; receptacles large, globose, about 5 mm. in diameter, the bracteoles forming shallow indurated cups; pedicels 4 to 10 mm. long, stout, slightly thickened at base and apex; fruits red, globose, 5 to 8 mm. in diameter.

RANGE: Mexico and the Yucatan Peninsula, usually at low elevations.

Specimens examined:

MEXICO: Kerber 177 (B), 236 (B, type of *S. kerberi*); Hahn ♂ (K, P). TAMAULIPAS: Jaumave, Von Rozynski 443 ♀ (F), 635 ♀ (F).

SAN LUIS POTOSÍ: Tamasopo Canyon, Pringle 7686 ♂ (G, US).

VERACRUZ: Houston (BM, type). Papantla, Schiede & Deppe 985 ♀

(B, type of *S. medica*, BM, V). Tantoyuca, Huasteca, *Ervendberg* 244 ♀ (G), 336 ♀ (G, K, type of *S. medica* var. *bracteata*), 337 ♀ (G, K). Remudadero, *Purpus* 9021 ♂ (F, G, Mo, US, Y). Puerto Viejo, *Palmer* 392 ♂ ♀ (G, Mo, US, Y). San Sebastián, *Liebmann* 14657 (F).

TABASCO: San Sebastián. *Rovirosa* 402 ♂ (K, US).

BRITISH HONDURAS: El Cayo, *Bartlett* 12010 (Mich, US), 12086 (Mich, US). Corozal, *Lundell* 4778 ♀ (Mich, US); *Gentle* 359 ♀ (Mich, US).

GUATEMALA: Uuxactun, Petén, *Bartlett* 12337 (F, Mich, US), 12747 (Mich).

Local name: "Es 'co 'ka" (British Honduras).

This important species, so long known as *Smilax medica* Schlecht. & Cham., is one of the chief sources of commercial sarsaparilla, and it is therefore unfortunate that the name must be displaced by the little-known *S. aristolochiaefolia* Mill., which has priority by many years.

The distinctions between this species and *S. regelii* are given under the latter.

9. *Smilax vanilliodora* Apt, Repert. Sp. Nov. Fedde 18: 416. 1922.

PLATE 4.

Smilax tonduzii Apt, *op. cit.* 414. Type, without flowers or fruit, in the Berlin Herbarium, collected on the bank of the Río Ciruelas, Costa Rica, by Tonduz (No. 2233).

Smilax gilgiana Apt, *op. cit.* 417. Type in the Berlin Herbarium, collected at Guácimo, Costa Rica, alt. 120 meters, by Tonduz (No. 14639).

Smilax barbillana Cuf. Arch. Bot. Sist. Fito. & Gen. 9: 186. 1933. Type (not seen) from Río Barbilla, 28 miles from Puerto Limón, Costa Rica, alt. 40 meters, *Cufodontis* 658.

Stems ligneous, smooth, glabrous, striate, quadrangular, armed with stout, yellowish, flattened spines; petiole up to 3.7 cm. long, glabrous, the free part articulate at or below the middle; leaf blades oblong-lanceolate, oblong, or ovate, up to 23 cm. long and 10.5 cm. wide, acuminate at apex, broadly cuneate to subcordate at base, chartaceous, entire, glabrous, not lobed, sometimes aculeate on the principal nerves beneath, 5- to 9-nerved, the outermost nerves submarginal, the central nerves sometimes arising a little above the base; staminate flowers not known; peduncles of ♀ umbels solitary or borne in short, bracteate, axillary branchlets, the peduncle usually longer than the petiole; receptacle globose, the bracteoles numerous, acuminate, glabrous; pedicels up to 1.7 cm. long, glabrous; perianth segments pale green, linear-lanceolate, up to 10 mm. long, 1.5 to 2 mm. wide, glabrous, acute; staminodia 3, subulate, up to 5 mm. long; styles 3, very long (about 3.5 mm.); fruiting peduncles longer than the petioles, up to 4.5 cm. long, obviously flattened; pedicels up to 2 cm. long; berries red, globose, over 1 cm. in diameter.

RANGE: Costa Rica, from sea-level to 1900 meters elevation.

Specimens examined:

COSTA RICA: Río Ciruelas, *Tonduz* 2233 (B, type of *S. tonduzii*). Hacienda El Guayabo, near Turrialba, 600 to 700 meters, *Gómez* ♀ (B, type). Guácimo, 120 meters, *Tonduz* 14639 (B, type of *S. gilgiana*). Cañas Gordas, *Pittier* 11076 ♀ (US, V). Talamanca, *Tonduz* 9516 ♀ (US, V).

Tilarán, Guanacaste, *Standley & Valerio* 45777 ♀ (US), 45914 ♀ (US). Viento Fresco, Alhajuela, *Standley & Torres* 47984 ♀ (US). Cairo, Limón, *Standley & Valerio* 49003 ♀ (US).

10. *Smilax regelii* Killip & Morton, nom. nov.

Smilax grandifolia Regel, Ind. Sem. Hort. Petrop. 16. 1856, non Buckl. 1843. The original publication has not been accessible, but from the excellent description given by A. DeCandolle, as well as from a specimen in the Gray Herbarium marked "*Smilax grandifolia* Rgl. Ex horto bot. Petropolitano," there can be no doubt of the proper reference of *S. grandifolia* Regel to the present species. The specimen in the Gray Herbarium is probably from type material.

Smilax ornata Hook. in Bot. Mag. 115: pl. 7054. 1889, non Lemaire, 1865. Described from cultivated material.

Smilax utilis Hemsl. in Hook. Ic. Pl. 26: pl. 2589. 1899, non Wright (Kew Bull. 1895: 138. 1895). Described from cultivated material received originally from Jamaica, where it was also under cultivation.

Lower stems sharply quadrangular, very stout, about 12 mm. in diameter, armed (chiefly on the angles) with large, broad, flat, straight or recurved spines 1 cm. long and 8 to 11 mm. broad at base, the upper stems all sharply quadrangular, often somewhat winged on the angles, aculeate; petioles of lower leaves up to 7 cm. long, aculeate, the free part articulate at or above the middle; lower leaf blades very large, variable in shape, ovate, oblong or narrowly oblong, up to 30 cm. long and up to 21 cm. broad, rounded or short-acuminate at apex, openly or deeply cordate or hastate at base, or rarely with broadly flaring basal lobes, the upper leaves much smaller, oblong-lanceolate or oval, acute at base, all chartaceous, concolorous, glabrous, often armed on the principal nerves beneath with short recurved whitish spines, the larger 7-nerved, the smaller 5-nerved, the outer nerves submarginal, the nerves and reticulate secondary veins elevated on both surfaces; peduncles of ♂ umbels solitary or borne in bracteate, axillary branchlets, up to 6.5 cm. long, longer than the subtending petioles, very slender, glabrous, unarmed, slightly flattened; receptacles globose, the bracteoles at the base of the pedicels numerous, irregular, glabrous, indurate in age; pedicels 7 to 12 mm. long, very slender; perianth segments lanceolate, 3.5 to 5 mm. long, 1 to 1.5 mm. wide, the outer slightly larger than the inner; filaments 1.2 mm. long or less, stout; anthers longer than the filaments, 2 to 2.5 mm. long; pistillate flowers not seen; pistillate peduncles solitary, axillary, up to 10 cm. long but usually shorter, flattened; receptacles in fruit globose, about 4 mm. in diameter, the bracteoles forming a low indurate cup at the base of the pedicels; pedicels 9 to 19 mm. long, slender, thickened at the base and apex; fruits globose, large, up to about 1.3 cm. in diameter, black.

Common names: "Zarza," "zarzaparilla," "Honduras sarsaparilla," "Jamaica sarsaparilla."

RANGE: Northern Central America, from sea-level to 600 meters elevation.

Specimens examined:

BRITISH HONDURAS: *Schipp* 487 ♀ (F). Jacinto, *Schipp* 707 ♂ (BM, F).

GUATEMALA: Tikal, Petén, *Cook & Martin* 214 (US). Izabal, *Blake* 7865 (G, US); *Hernandez* in 1920 ♂ (US). Quiriguá, Izabal, *Standley* 23987 ♀ (G, US). Eastern portions of Verapaz and Chiquimula, *Watson* 327 ♀ (G).

HONDURAS: *Wilson* 636 ♂ (Y). Puerto Sierra, *Wilson* 354 (F, G, Y), 617 ♀ (F, G, Y). La Pimienta, *Niederlein* 62 (B, US). Lancetilla Valley, *Standley* 52745 ♀ (F, US), 54318 (F, US).

Apt discusses this species at length (*op. cit.* 409-414) and decides that the plants figured by Hooker as *S. ornata* and by Hemsley as *S. utilis* are the same and that they differ from the original *S. ornata* Lem., a conclusion with which we agree. This latter species, recognized doubtfully as valid by Apt, seems to be merely a form of *Smilax aristolochiæfolia* Mill. (*S. medica* Schlecht & Cham.). The name *S. utilis*, taken up by Apt, is invalidated by the earlier and very different species described by Wright from the Solomon Islands.

The three species, *Smilax regelii*, *S. aristolochiæfolia*, and *S. vanilliodora* are without doubt closely related, and in spite of the comparatively abundant material now available are still insufficiently known. *Smilax regelii* may be distinguished from *S. aristolochiæfolia* by its sharply quadrangular stems and branchlets, these in the latter species being subterete or rounded-quadrangular; also the berries are black, in contrast to the bright red fruits of *S. aristolochiæfolia*. In its black fruits *S. regelii* differs also from *S. vanilliodora*, a species with very much larger flowers.

10a. *Smilax regelii* var. *albida* Killip & Morton, var. nov.

A var. *typica* baccis albis distinguenda.

Type in the U. S. National Herbarium, No. 1,407,607, collected near Tela, Lancetilla Valley, Dept. of Atlántida, Honduras, Dec. 6, 1927-Mar. 20, 1928, by Paul C. Standley (No. 53257 ♀).

Known only from the type specimen.

11. *Smilax spissa* Killip & Morton, sp. nov.

Caules inferiores ignoti, superiores graciles, recti, teretes, læves, inermes; petioli usque ad 2 cm. longi, infra medium partis liberæ articulati; lamina foliorum oblonga, usque ad 16 cm. longa et 6 cm. lata, chartacea, apice acuminata, basi acuta, glabra, integra, non lobata, pallide viridis, 5-nervia, nervis extimis marginalibus et inconspicuis, nervis alteris supra impressis, subtus elevatis, venis secundariis subparallelis, vix reticulatis; pedunculi umbellarum masculinarum solitarii quam petioli longiores, usque ad 4.5 cm. longi, glabri, subteretes, graciles; receptaculum ca. 5 mm. diametro, sub-sphæroideum, bracteolis lanceolatis, acuminatis, glanduloso-denticulatis, quam alabastris longioribus; pedicelli nulli; flores numerosi, spissi, perianthii segmentis exterioribus ovato-oblongis, ca. 4 mm. longis et 1.5 mm. latis, acutis, plus minusve concavis, segmentis interioribus multo minoribus, anguste ovalibus, ca. 3 mm. longis et 1-1.2 mm. latis, incurvis; filamenta 1-1.5 mm. longa, antheris (1.5-2 mm. longis) breviora; flores feminei ignoti; pedunculus fructiferus solitarius, axillaris, 1.5-2.3 cm. longus, teres, petiolo longior; receptaculum globosum, ca. 4 mm. diametro, bracteas lanceolatas patentes acuminatas persistentes gerens; pedicelli 5-7 mm. longi, basi bulboso-inflati, apice incrassati et disciformes; baccæ rubræ, maximæ, usque ad 15 mm. diametro; semina rubra, usque ad 8 mm. longa.

Type in the U. S. National Herbarium, No. 1,080,290, collected between La Muerte and La División, Costa Rica, Jan. 19, 1891, by H. Pittier (Herb. Nat. Costa Rica 3470 ♂).

RANGE: Costa Rica and Panama, from sea-level to 500 meters elevation.

Additional specimens examined:

COSTA RICA: Terraba, *Pittier* 407 ♂ (US). Buenos Aires, *Tonduz* 6612 ♀ (US). Santo Domingo de Golfo Dulce, *Tonduz* 7224 ♂ (US), 9886 ♂ (US).

PANAMA: Barro Colorado Island, *Bailey & Bailey* 364 ♂ (F); *Standley* 31295 (US), 31314 ♂ (US), 40796 ♂ (US), 40820 ♀ (US); *Shattuck* 767 ♀ (F); *Wetmore & Woodworth* 49 ♂ (F). Between Gorgona and Gatun, *Pittier* 2260 ♀ (G, US).

This has been misidentified as *Smilax panamensis*. It may, however, be easily distinguished by the solitary, axillary staminate umbels (those of *S. panamensis* being borne on short, axillary, bracteate, raceme-like branchlets), sessile staminate flowers, and very unequal perianth segments. Also the leaves differ in venation, being essentially 3-nerved with parallel secondary veins. The leaves of *S. panamensis* are essentially 5-nerved, with the secondary veins prominently reticulate.

12. *Smilax panamensis* Morong, Bull. Torrey Club 21: 441. 1894.

Smilax ramonensis Apt, Repert. Sp. Nov. Fedde 18: 405. 1922.

Lower stems about 1.5 cm. in diameter, perfectly terete, smooth, shining, glabrous, pale brown, armed with large straight broad-based spines 2 cm. long, the upper stems terete, smooth, unarmed; petioles up to 3 cm. long, the free portion articulate near the base; leaf blades ovate-oblong or the upper lanceolate-oblong, the largest 19 cm. long and 9.5 cm. broad, thick-chartaceous, short-acuminate at apex, acute or obtuse at base, entire, not lobed, glabrous, unarmed, concolorous, 7-nerved, the outer nerves submarginal, the secondary veins prominently reticulate; staminate umbels borne in short bracteate branchlets, these often paired or clustered in the leaf axils, the peduncle proper up to 2 cm. long, flattened; receptacle about 2.5 mm. in diameter, the bracts broad-based, acute, glandular-denticulate; pedicels 5 to 8 mm. long, slender, terete; perianth segments about equal, ovate-lanceolate, 4 to 6 mm. long and 1.5 to 1.75 mm. wide, green, acute, not recurved at apex; anthers 2 to 2.75 mm. long, slightly or usually much longer than the filaments; peduncles of pistillate umbels solitary and axillary, or borne in short, axillary, bracteate racemes, the peduncle proper up to 1.5 cm. long, flattened; pedicels 8 mm. long or less; perianth segments blackish when dry, equal, about 5 mm. long; staminodia 6, fleshy, subulate, about 1 mm. long; styles 3, about 1.5 mm. long; fruiting peduncles up to 2.5 cm. long, flattened, the receptacle enlarged; pedicels 7 to 15 mm. long, conspicuously bulbous-thickened at base, enlarged and disk-like at apex; berries large, 7.5 to 10 mm. in diameter, seemingly red.

RANGE: Honduras, Costa Rica, and Panama, from sea-level to 1600 meters elevation.

Specimens examined:

GUATEMALA: Panzal, Baja Verapaz, *Türckheim* II. 1701 ♂ (US).

HONDURAS: Lancetilla Valley, *Standley* 56852 ♂ (F, US); *Yuncker* 4776 ♀ (F, Mich); *Wilson* 66 ♀ (US, Y).

COSTA RICA: San Pedro, near San Ramón, 1400 to 1600 meters, *Tonduz* 17723 ♂ (B, type of *S. ramonensis*, BM, Brux, Gen), 17724 (B), 17726 ♀

(B, BM). Reventazón Valley, *Cook & Doyle* 296 ♂ (US). Talamanca, *Tonduz* 9242 ♂ (US). Cañas Gordas, *Pittier* 11075 ♀ (US). El General, *Pittier* 10623 ♀ (US); *Skutch* 2583 ♂ (US), 2586 ♀ (US). Arenal, *Valerio* 97 (US). Pejivalle, Cartago, *Standley & Valerio* 47188 (US).

PANAMA: Gatun Station, *Hayes* 63 ♂ (Y, type), 68 (Y). Barro Colorado Island, *Shattuck* 699 ♀ (F); *Wetmore & Abbe* 168 ♀ (F, G).

The confusion surrounding this species dates from its original publication by Morong, whose description of the pistillate plants and fruits was drawn from *Hayes* 209, representing a species (*S. mollis*) entirely different from the two staminate specimens cited (*Hayes* 63 and 68). Notes to this effect by Dr. J. B. Norton are on the type specimens in the New York Botanical Garden.

Apt misunderstood this species and placed it in the group with flowers less than 3 mm. long, although these were correctly described by Morong as 2 to 3 lines long. The two specimens cited by Apt as *S. panamensis* are in reality *S. spinosa* Mill. The true *S. panamensis* he describes as a new species, *Smilax ramonensis* Apt.

Further confusion has resulted from the mistaken reference of numerous specimens of *Smilax spissa* to this species. The two species grow in association, but differ in some important characters.

13. *Smilax glauca* Walt. Fl. Car. 245. 1788.

Smilax discolor Schlecht. Linnæa 18: 454. 1844. Type from Jalapa, Veracruz, Mexico, collected by Schiede and Deppe.

Stem slender, terete, smooth, glabrous, sparingly armed with short, often curved prickles, the branchlets glaucous, unarmed; petioles up to 22 mm. long, glabrous, glaucous when young, articulate at or below the middle of the free part; leaf blades ovate or rarely oblong, the largest 8 cm. long and 6 cm. wide, the apex sharply acute, complicate, the base obtuse, entire, not lobed, thinly chartaceous, green above, pale and glaucous beneath, especially when young, glabrous, 7-nerved; peduncles of ♂ umbels up to 2.7 cm. long, much exceeding the subtending petioles, glaucous, flattened, solitary; receptacle low, about 2 mm. in diameter, the bracts lanceolate, acute; pedicels up to 6 mm. long, glabrous, glaucous; perianth segments oblong-lanceolate, about 5 mm. long, acute, glabrous, glaucous; filaments about 2 mm. long, the anthers slightly shorter (about 1.75 mm. long); peduncles of ♀ umbels up to 3.5 cm. long, obviously flattened, increasing in fruit to about 4.5 cm. in length; pedicels up to 8 mm. long in anthesis, increasing to 1 cm. in fruit, glaucous; perianth segments lanceolate, about 3.5 mm. long, glaucous; staminodia 12, a pair opposite each perianth segment, about 1 mm. long, obtuse at tip; styles 3, 0.75 to 1.2 mm. long.

RANGE: Tropical Mexico, at middle elevations. Also eastern and southern United States.

Specimens examined:

VERACRUZ: *Botteri* 1001 (P). Jalapa, *Pringle* 8115 ♂ ♀ (Boiss, Brux, F, G, Gen, K, Mo, P, US, V, Y).

OAXACA: *Galeotti* 5482 (P). Cuicatlán District, *Conzatti* 3541 ♀ (US).

The Mexican specimens differ in no way from forms occurring in the eastern United States.

14. *Smilax bona-nox* L. Sp. Pl. 1030. 1753.

PLATE 5.

Smilax cordifolia H. & B. ex Willd. Sp. Pl. 4: 778. 1806. The type, collected by Humboldt and Bonpland in Mexico, has been studied and photographed by the senior author.

Smilax platycentron Schlecht. Linnæa 18: 452. 1844. The type, collected by Schiede and Deppe at Jalapa, Veracruz, Mexico, has not been available, but from the description there seems no doubt of its identity with *S. bona-nox*.

Smilax platycentron var. *emarginata* Schlecht. op. cit. 453. Type collected at El Puente de Dios, Veracruz, Mexico, by Ehrenberg. A specimen in the Berlin Herbarium indicates a peculiar form of *S. bona-nox* with very large, emarginate leaves. Nothing matching it has been seen elsewhere and it may represent a recognizable variety.

Smilax platycentron var. *hastata* Schlecht. op. cit. 454. Type (not seen) from Puente de Dios, Veracruz, Mexico.

Smilax senticosa Kunth, Enum. 5: 209. 1850. Type in the Berlin Herbarium, collected at Puente de Dios by Ehrenberg (No. 777). This is Apt's species No. 38, which he leaves unnamed, suggesting, that it may represent an undescribed species.

Smilax bona-nox subsp. *polyodonta* var. *senticosa* A. DC. Monogr. Phan. 1: 79. 1878. Founded on *S. senticosa* Kunth.

High climbing vine; lower stems subterete, striate, pale yellowish, the upper obtusely quadrangular, often flexuous, armed with stout, flattened, straight spines, acicular prickles absent; petioles 6 to 20 mm. long, the free part articulate slightly below the middle; leaf blades broadly deltoid, the largest 7 cm. long and 8 cm. wide, rounded and mucronate at apex, cordate at base, often hastately lobed toward base and narrowed at the middle, entire or the margin armed with short acicular prickles, the midrib beneath often armed with short spines, the texture varying from coriaceous to membranous, 7- to 9-nerved, the nerves and prominently reticulate secondary veins elevated above; peduncles of ♂ umbels solitary or borne in short, bracteate, raceme-like branchlets, 7 to 17 mm. long, exceeding the subtending petiole, obviously flattened; receptacle low, the bracts narrowly lanceolate, acuminate, slightly denticulate, persistent; pedicels 5 to 8 mm. long, slender, glaucous, glabrous; perianth segments oblong-linear, 4 to 5.5 mm. long, glabrous, glaucous; filaments 2 to 2.75 mm. long, slender; anthers shorter than the filaments 1.5 to 2 mm. long; peduncles of ♀ umbels up to 3 cm. long, obviously flattened; receptacle small, not over 2.5 mm. in diameter at maturity; pedicels 3 to 4 mm. long, glaucous; perianth segments oblong-lanceolate, 3 to 3.5 mm. long, 1 mm. wide, acute, recurved, glaucous externally; staminodia 6, subulate, about 1 mm. long; styles 3, less than 1 mm. long; berries black, up to 8 mm. in diameter.

RANGE: Tropical Mexico, at middle elevations. Also, West Indies and eastern United States.

Specimens examined:

MEXICO: *Schaffner* 181 (B), 184 (B). *Coulter* 1520 ♀ (G). Maltrata, *Kerber* 166a ♂ (B), 176a ♀ (B), 220 ♀ (B, Boiss, BM, K, US).

NUEVO LEÓN: *Monterey, Trelease* 153 ♀ (Mo); *Canby* 240 ♀ (US); *Dodge* 85 (US); *Pringle* 2880 ♀ (G, Mo).

TAMAULIPAS: El Milagro, *Bartlett* 11073 ♀ (F), 11090 ♀ (F), 11102 (F).

SAN LUIS POTOSÍ: Las Canoas, *Pringle* 3658 ♀ (G).

VERACRUZ: *Schiede & Deppe* 984 in part ♂ (B), in 1829 ♀ (BM). Jalapa, *Humboldt & Bonpland* (P, type collection of *S. cordifolia*); *Galeotti* 5478

♂ (P), 5479 (Brux, K, P); *Coulter* 1590 (K); *Linden* 49 (K); *Pringle* 8072 ♂ ♀ (Boiss, BM, Brux, F, G, Gen, K, Mo, P, US, V, Y); *Orcutt* 2817 ♀ (F, Mo). Orizaba, *Botteri* 452 ♀ (G, US); *Müller* ♀ (Y). Mirador, *Liebmann* 14639 ♂ (F), 14640 ♂ (F), 14641 ♀ (F, US), 14643 ♂ (F), 14678 (F). Zacuapan, *Purpus* 7891 ♀ (B). Huatusco, *Müller* 69 (Y). El Puente de Dios, *Ehrenberg* 777 in part ♀ (B, type of *S. senticosa*), 777 in part (B, type collection of *S. platycentron* var. *emarginata*).

A wide-spread and variable species, but the Mexican forms do not appear to be even varietally distinguishable from those of the United States.

15. *Smilax moranensis* Mart. & Gal. Bull. Acad. Brux. 9²: 389. 1842.

Smilax densiflora A. DC. Monogr. Phan. 1: 88. 1878. Type from Toluca, State of Mexico, collected by Andrieux (No. 69). The number is incorrectly cited as 9 by A. DeCandolle.

Smilax densiflora var. *chrismarensis* A. DC. *op. cit.* 89. Type collected by Chrismar near San Miguel, Mexico, in 1847 (Herb. Berol.).

Smilax moranensis var. *schaffneriana* A. DC. *op. cit.* 88. Founded on *Schaffner* 159, from Mexico (Herb. Berol.).

(?) *Smilax uruapensis* Sessé & Moc. Fl. Mex. ed. 2, 232. 1894. Type from Uruapan, Michoacán.

Smilax schaffneriana Apt, Repert. Sp. Nov. Fedde 18: 408. 1922. Founded on *S. moranensis* var. *schaffneriana* A. DC. Regarded as distinct by Apt on the basis of the numerous acicular prickles present on the stems. These, however, are present in lesser degree on many other specimens, and it would seem that the form is merely an ecological variant.

Lower stems terete, glabrous, about 4.5 mm. in diameter, armed with sharp, straight, blackish, slightly flattened spines, often mixed with shorter, terete, slenderer spines, the upper stems obtusely 4- or 5-angled, striate, pale green, glabrous, usually unarmed; petiole 15 mm. long or usually less, glabrous, articulate midway between the well-developed tendrils and the base of the blade; leaf blades chartaceous, pale green, slightly paler beneath, 7-nerved, the outer nerves submarginal, obviously reticulate, acute at apex, rounded and slightly tapering into the petiole at base, glabrous, unarmed, the margins inconspicuously callous-denticulate, the lower leaves ovate, not lobed, up to 13 cm. long and 7 cm. broad, the upper much smaller, ovate-lanceolate or lanceolate, often slightly lobed at base; peduncle of staminate umbel solitary in the leaf axils, 2.5 cm. long or usually less, longer than the subtending petiole, obviously flattened, often recurved; receptacle concave, flattened, about 3 mm. broad, the bracts subulate, thickened at base, about 1.2 mm. long; umbels up to 35-flowered but usually about 12-flowered, the pedicels glabrous, terete, slightly enlarged upwardly, 5 to 9 mm. long, always much shorter than the peduncle; perianth segments 5 to 6.5 mm. long, 1 to 1.5 mm. broad, oblanceolate or linear-oblanceolate, acute at apex, slightly narrowed toward base, recurved, glabrous, inconspicuously papillose at apex; filaments thick, 2.25 to 4 mm. long, the anthers always much shorter, 1.75 to 2 mm. long; peduncle of pistillate umbel exceeding the subtending petiole, obviously flattened, the pedicels 3 to 5 mm. long, or up to 10 mm. long in fruit; pistillate perianth segments 3 to 4 mm. long, lanceolate, recurved; staminodia 6, subulate, 1.5 to 1.75 mm. long; ovary ellipsoid, glabrous; styles about 1.5 mm. long, divergent, recurved at apex, papillose; berry spherical, 4 to 6 mm. in diameter.

RANGE: Central plateau of Mexico, at altitudes from 1750 to 3150 meters.

Specimens examined:

MEXICO: *Sessé & Mociño* (type collection of *S. uruapensis*? Boiss, K); *Schmitz* 443 (V), 468 (B, V); *Andrieux* 35 (Gen); *Uhde* 159 (B); *Kerber* 235 (B); *Schaffner* 183 (B); El Carmen, *Ehrenberg* 522 (B). San Miguel, *Chrismar* in 1849 (B, type of *S. densiflora* var. *chrismarensis*).

NUEVO LEÓN: Mesa Cañon, *Mueller & Mueller* 20 (F).

SAN LUIS POTOSÍ: *Schaffner* 233 (B, G, Y), 531 (K). Alvarez, *Palmer* 52 (US).

SINALOA: Colomas, *Rose* 1636 (US).

JALISCO: *Jones* 468a (US). Between Chico and Chapala, *Graham* 342 (BM, K).

HIDALGO: Morán, near Real del Monte, alt. 2250 meters, *Galeotti* 5470 (P, type collection). Trinidad Iron Works, *Pringle* 8898 (BM, Boiss, F, G, Gen, K, Mo, US, V, Y). Zimapan, *Coulter* 1589 (G, K).

VERACRUZ: Orizaba, *Galeotti* 5476 (Brux, Gen, K, P).

PUEBLA: Iztaccihuatl, *Purpus* 212 (G, Mo, US). Chinantla, *Liebmann* 14664 (F), 14665 (F).

STATE OF MEXICO AND FEDERAL DISTRICT: *Andrieux* 69 (Gen, type of *S. densiflora*, K, P, V); *Bourgeau* 237 (K, P), 1131 (K, P); *Rose & Hay* 5517 (US); *Pringle* 7627 (F, G, Mo, US), 8970 (BM, Boiss, F, G, Gen, K, Mo, US, V, Y), 9474 (F, G, K, Mo, US, Y); *Lyonnet* 218 (US); *Hinton* 408 (K), 3478 (K), 3523 (K), 4041 (K).

MORELOS: Cuernavaca, *Pringle* 7661 (G, US).

MICHOACÁN: Santa María, *Arsène* (F).

COLIMA: Volcán de Colima, *Jones* 468b (US).

GUERRERO: *L. Schultze* 191 (B).

OAXACA: Reyes, *Nelson* 1726 (US). Cerro de San Felipe, *Conzatti* 2248 (F); *Liebmann* 14667 (F), 14667a (F). Cerro La Raya, *Conzatti* 3479 (US).

Local name: "Palo de la vida."

This species is confined to the Mexican plateau and its boundaries. The usually small pale-green leaves, often slightly lobed at base, are minutely erose-denticulate on the margins.

15a. *Smilax moranensis* var. *mexiae* Killip & Morton, var. nov.

A var. *typica* foliis latioribus basi cordatis vel subcordatis, marginibus subintegris, pedicellis fructiferis gracilioribus differt.

Type in the U. S. National Herbarium, No. 1,319,300, collected in the Sierra Madre Occidental, at Arroya de Santa Gertrudis, San Sebastián, Jalisco, Mexico, alt. 1500 meters, Jan. 21, 1927, by Ynes Mexia (No. 1536). Duplicates at F, Mo, Y.

This is perhaps a distinct species, but in the absence of flowering material of either sex it seems advisable to describe it as merely a variety, recognizable by its relatively broad, cordate-based leaves. In this respect it suggests *S. jalapensis*, but we have no doubt that its relationship is with *S. moranensis*.

16. *Smilax jalapensis*¹ Schlecht. Linnæa 18: 451. 1844.

Smilax erythrocarpa Kunth, Enum. 5: 234. 1850. Type in the Berlin Herbarium, collected in Mexico by Ehrenberg. The specimen is in poor condition and exhibits only foliage and a solitary peduncle, this exceptionally long.

Smilax sylvatica Kunth, *op. cit.* 234. Type in the Berlin Herbarium, collected "In sylvis Papantlæ prope Misantla," Veracruz, Mexico, by Schiede and Deppe. The other specimen cited by Kunth (*Ehrenberg* 522) is *S. moranensis*.

Smilax schiedeana Kunth, *op. cit.* 236. Type in the Berlin Herbarium, collected at Jalapa, Veracruz, Mexico, by Schiede and Deppe. It is sterile, but the leaves are precisely those of *S. erythrocarpa* Kunth.

Smilax cordifolia var. *schiedeana* A. DC. Monogr. Phan. 1: 84. 1878. Founded on *S. schiedeana* Kunth.

Smilax cordifolia var. *papantlæ* A. DC. *op. cit.* 84. Founded on the same specimen as *S. sylvatica* Kunth.

Smilax invenusta var. *armata* A. DC. *op. cit.* 91. Type collected at Jalapa, Veracruz, Mexico, by Galeotti. DeCandolle also cites *Linden* 48, from Jalapa. This specimen and a photograph of the Galeotti specimen have been examined and found to be typical *S. jalapensis*.

Smilax jalapensis var. *inermis* Apt, Repert. Sp. Nov. Fedde 18: 403. 1922. No type is cited.

Branches and branchlets terete, usually straight, sparingly armed with straight, yellowish, flattened spines, the younger branchlets sometimes with numerous, small, acicular spines, often apparently unarmed; petioles up to 20 mm. long, articulate about midway between the tendrils and the base of the blade; lower leaf blades ovate, up to 12 cm. long and 7 cm. wide, short-acuminate, subcordate at base, rarely a little lobed at base, the upper leaves smaller, ovate-lanceolate, rounded at base, all thin-chartaceous, glabrous, unarmed, drying blackish, entire, 7-nerved, the outer nerves submarginal; peduncle of ♂ umbel exceeding the subtending petiole, up to 4 cm. long, obviously flattened, glabrous; receptacle subhemispherical, many-flowered, the bractlets caducous, small, acuminate; pedicels up to 13 mm. long, slender, not enlarged upwardly; perianth segments linear or linear-lanceolate, 5 to 6.2 mm. long, 1.2 to 1.5 mm. wide, acuminate; filaments 2 to 3 mm. long, fleshy; anthers equaling or shorter than the filaments, about 2 mm. long; peduncle of ♀ umbel solitary, exceeding the subtending petiole, about 15 mm. long at anthesis, increasing to 28 mm. in fruit, much flattened; pedicels 3 to 4 mm. long; perianth segments narrow, 3 to 3.5 mm. long, recurved at apex, caducous; staminodia 3 or 6, subulate, 0.8 to 1.5 mm. long; stigmas 3, about 1 mm. long; berries subspherical, about 8 mm. in diameter; seeds red.

RANGE: Veracruz and Guatemala, at altitudes from 1200 to 1800 meters.

Specimens examined:

MEXICO: *Ehrenberg* (B, type of *S. erythrocarpa*, F, photograph); *Sessé & Mociño* (K); *Hahn* (K). Cajadero, *Liebmann* 14648 (F, US).

TAMAULIPAS: San Lucas, *Viereck* 621 (B).

VERACRUZ: Jalapa, *Schiede & Deppe* in 1829 (BM, type collection?), 989 (B, type of *S. schiedeana*); *Galeotti* (K, type of *S. invenusta* var. *armata*, US, photo); *Linden* 48 (K); *Pringle* 7829 (G), 7830 (G), 8166 (BM, Boiss, Brux, F, G, Gen, K, Mo, P, US, V, Y). Papantla, *Schiede & Deppe* 984 in part (B, type of *S. sylvatica* and *S. cordifolia* var. *papantlæ*, BM); *Liebmann* 14646 (F). Pital, *Liebmann* 14649 (F). Orizaba, *Müller* in 1853 (Y). Zacuapan, *Purpus* 8185 (G, Mo, Y). Colipa, *Liebmann* 14645 (F), 14647 (F), 14650 (F).

¹ Spelled *xalapensis* by Kunth, *op. cit.* 258.

GUATEMALA: Cobán, Alta Verapaz, *Türkheim* 890 (B, G, K, US). San José Pinula, *Salas* 313 (US).

Local name: "Bejuco de la vida."

Although the key characters given to distinguish the present species from *Smilax moranensis* are very weak and, in fact, do not always hold true, especially for the variety *mexica*, it has not seemed possible to find better ones at present. Nevertheless the two species seem to us amply distinct and perhaps not even closely related. They inhabit different geographic and climatic areas and may be distinguished at a glance by one familiar with them both.

16a. *Smilax jalapensis* var. *botterii* (A. DC.) Killip & Morton, comb. nov.

Smilax botterii A. DC. Monogr. Phan. 1: 89. 1878.

Stems sharply or obtusely quadrangular, sparingly aculeate, the spines straight, obviously flattened; petioles up to 3 cm. long, articulate about midway between the base of the blade and the tendrils; lower leaf blades ovate, up to 16 cm. long and 9 cm. wide, acute and complicate at apex, cordate or subcordate at base, the upper leaves ovate-lanceolate, much smaller, rounded or obtuse at base, all 7-nerved, chartaceous, drying blackish, entire, not lobed, glabrous, unarmed; peduncle of ♂ umbel longer or shorter than the subtending petiole, up to 1.8 cm. long, glabrous, obviously flattened, usually recurved; receptacle hemispherical, the bractlets caducous, small, acuminate; pedicels shorter than the peduncle, about 7 mm. long, slender, glabrous; perianth segments about 4 mm. long and 1.5 mm. wide, spreading; filaments equaling the anthers, about 1.5 mm. long; peduncles of ♀ umbels variable in length, equaling or exceeding the subtending petiole, solitary or clustered; pedicels 4 mm. long in anthesis, becoming 8 mm. long in fruit; perianth segments about 4 mm. long; staminodia 6, minute, subulate; style branches 3, about 0.75 mm. long; berries spherical, about 5 mm. in diameter.

RANGE: Coextensive with the typical form of the species.

Specimens examined:

MEXICO: *Schaffner* 179 (B).

VERACRUZ: Orizaba, *Botteri* 467 (B, BM, Boiss, G, Gen, type of *S. botterii* K, P, US, V); *Bourgeau* 2509 (K, P), 2650 (Brux, G, K, P). Huatusco, *Müller* 412 (V, Y). Veracruz, *Purpus* in 1919 (US). Jalapa, *Pringle* 8168 (BM, Boiss, Brux, F, G, Gen, K, P, US, V, Y).

GUATEMALA: *Heyde* 210 (US). San Miguel Uspantán, Quiché, *Heyde & Lux* 3526 in part (B, Gen, US). Cobán, Alta Verapaz, *Türkheim* II. 2218 (Gen, US); *Lehmann* 1427 (BM, Boiss, K, US).

Differs from typical *S. jalapensis* only in having definitely quadrangular branchlets.

17. *Smilax standleyi* Killip & Morton, sp. nov.

Caules lignosi, tenues, acriter quadrangulati, ut videtur inermes; petiolus usque ad 25 mm. longus, infra medium partis liberæ articulatus, glaber; lamina foliorum ovato-oblonga, maxima 9 cm. longa at 5 cm. lata, membranacea, concolor, pallide viridis, glabra, inermis, apice acuta, basi obtusa,

integra, non lobata, 5-nervia; pedunculus umbellarum ♂ solitarius, axillaris, usque ad 2.5 cm. longus, petiolo longior, compressus, glaber; receptaculum parvum, 1.5-2 mm. diametro, bracteis minutis; pedicelli usque ad 9 mm. longi, glabri, graciles; perianthii segmenta viridia, lanceolata, ca. 5 mm. longa (plus minusve immatura); filamenta antheris longiora; pedunculus umbellarum ♀ solitarius, usque ad 2 cm. longus, compressus; pedicelli 8-9 mm. longi, glabri; perianthii segmenta lanceolata, ca. 5 mm. longa; staminodia 3, subulata, ca. 1.2 mm. longa; styli 3, ca. 1.5 mm. longi; pedunculi fructiferi ca. 3 cm. longi; pedicelli fructiferi ca. 1 cm. longi; baccæ rubræ, ca. 8 mm. diametro.

Type in the U. S. National Herbarium, No. 1,254,174, collected at Los Ayotes, near Tilarán, Prov. of Guanacaste, Costa Rica, alt. 600 to 700 meters, Jan. 21, 1926, by Paul C. Standley and Juvenal Valerio (No. 45557 ♂).

RANGE: Restricted to Costa Rica.

Additional specimens examined:

COSTA RICA: Quebrada Serena, southeast of Tilarán, Guanacaste, *Standley & Valerio* 46136 ♀ (US), 46151 (US), 46308 (US).

Closely related to *Smilax jalapensis* of Mexico and Guatemala, especially to the variety *botteri*, but differing in its pale-green 5-nerved leaves, these all small and never subcordate at base. The leaves of *S. jalapensis* are blackish when dry, 7-nerved, and the larger subcordate at base.

18. *Smilax subpubescens* A. DC. Monogr. Phan. 1: 69. 1878. PLATE 6.

Stems obtusely quadrangular, unarmed, striate, rufescent-tomentose when young, glabrous at maturity; petioles up to 7 cm. long, rufescent-tomentose when young, glabrescent at maturity but at least a few hairs persistent on the sheath, the free part articulate above the middle; lower leaf blades broadly ovate, up to 24 cm. long and 19 cm. broad, short-acuminate at apex, deeply and openly cordate at base, the upper blades much smaller, ovate, acuminate at apex, merely rounded or subtruncate at base, all papyraceous, entire, not lobed, unarmed, densely reddish tomentose on both sides when very young, soon glabrescent, the older leaves almost entirely glabrous, shining above, paler and dull beneath, 9- to 11-nerved, the inner nerves arising above the base, the secondary prominently reticulate; peduncles of ♂ umbels solitary, axillary, up to 3.5 cm. long, usually shorter than the subtending petiole, rarely longer, obviously flattened, reddish tomentulose; receptacle globose, about 5 mm. in diameter, the bracteoles numerous, densely hairy; pedicels up to 1.5 cm. long, reddish or brown-tomentulose; perianth segments narrowly oblong, 5 to 6 mm. long, 1 to 1.5 mm. wide, sparsely or densely tomentulose, the midrib conspicuous; filaments 2.5 to 4 mm. long, the anthers much shorter, 1.6 to 2 mm. long; peduncles of ♀ umbels about 1 cm. long, obviously flattened, shorter than the subtending petioles; pedicels about 6 mm. long, slender; perianth segments 4 mm. long, 1 mm. wide, tomentulose; staminodia 6, subulate, alternately unequal; fruiting peduncles up to 2.5 cm. long; receptacles globose, foveolate; pedicels up to 1.8 cm. long, glabrate; berries bright orange, subglobose or often slightly attenuate at base and apex.

RANGE: Tropical Mexico south to Costa Rica; at middle elevations in Mexico (1100 to 1675 meters) and up to 2900 meters in Costa Rica.

Specimens examined:

VERACRUZ: San Cristóbal, Orizaba region, *Bourgeau* 2578 ♀ (K, P, type). Orizaba, *Botteri* 454 (G); 944 (K).

PUEBLA: Zacapoaxtla, *Salazar* in 1913 ♀ (US).

OAXACA: Totontepec, *Nelson* 824 ♂ (US).

GUATEMALA: San Miguel Uspantán, Quiché, *Heyde & Lux* 3526 in part ♂ (G, K, US). Sierra Cuchumatanes, Huehuetenango, *Skutch* 1085 ♀ (US). Cobán, Alta Verapaz, *Türkheim* II. 988 (= J. D. Smith Dist. 8765, US), II. 1352 ♂ (US). Sierra de las Minas, Baja Verapaz, *Kellerman* 6707 (F). Chichavac, Chimaltenango, *Skutch* 384 ♂ (US).

HONDURAS: Tegucigalpa, *Holman* in 1919 (US).

COSTA RICA: El Copey, San José, *Tonduz* 11732 in part ♀ (US), 11803 ♀ (BM, G, Gen, K, US, V, Y); *Standley* 43991 ♀ (US). Volcán de Poás, *Tonduz* 10769 (US). Santa María, *Stork* 1811 ♀ (F).

There has been much confusion concerning the identity of the present species. Apt omits it entirely. The treatment by Standley in *Trees and Shrubs of Mexico* is largely based on specimens of *Smilax mollis* var. *acuminata*, and specimens of true *S. subpubescens* are described as *S. tomentosa* H.B.K. Mature glabrate specimens have also received such diverse names as *S. cordifolia*, *S. domingensis*, *S. botteri*, and *S. mexicana* var. *costaricae*. The closest relationship is with the South American *Smilax tomentosa* H.B.K., which differs in having only 3 staminodia in the pistillate flowers and in having the mature leaves densely and closely tomentose beneath.

DeCandolle describes the present species as bearing small spines on the stems, but this may be an error. The type specimen does not bear any spines, nor do any of the numerous specimens that we have examined. It is not to be expected that spines would be found in this species, inasmuch as all other species of the section *Molles* are uniformly unarmed.

19. *Smilax purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 177. 1915.

Stems terete, unarmed, striate, almost entirely glabrous, but probably more or less hairy when young; petioles relatively very long (up to 4 cm.), often two-thirds as long as the blade, bearing a few persistent hairs, especially on the sheath, the free part apparently articulate below the middle; leaf blades broadly deltoid, up to 8 cm. long and 7.5 cm. broad, short-acuminate at apex, openly subcordate at base, papyraceous, entire, not lobed, unarmed, at maturity glabrous on both surfaces except for a few persistent hairs on the principal nerves above, 9-nerved, all the nerves arising from the base, the outermost submarginal, the secondary veins prominently elevated and reticulate on both surfaces; staminate flowers not known; peduncles of ♀ umbels solitary and axillary, or often borne in axillary bracteate branchlets, usually shorter than the subtending petiole, flattened, glabrate at maturity, only a few minute scattered hairs persisting; receptacle globose, the bracteoles numerous, densely hairy; pedicels 8 to 10 mm. long, sparsely pilosulous; perianth segments oblong-lanceolate, about 4.5 mm. long, 1 mm. wide, pilosulous without, glabrous

within; staminodia 3, subulate, about 1.6 mm. long; styles 3, erect, about 1 mm. long.

Specimens examined:

CHIAPAS: Cerro del Boquerón, *Purpus* 7420 ♀ (type collection, BM, F, G, Mo, US, Y).

Evidently a close relative of *Smilax subpubescens* A. DC., but differing in its broadly deltoid, long-petiolate leaves and terete branchlets.

20. *Smilax velutina* Killip & Morton, sp. nov.

Caules teretes, inermes, graciles, inferiores ca. 4 mm. diametro, dense et molliter flavescenti-velutini, demum glabrescentes; petioli usque ad 2.5 cm. longi, dense tomentosi, partis liberæ basin versus articulati; lamina foliorum oblonga vel ovata vel late elliptica, usque ad 15 cm. longa et 9.2 cm. lata (superiores multo minores), apice apiculata vel breviter acuminata, basi cordata vel subcordata, integra, non lobata, inermis, supra viridis, juventute subtomentosa, mox glabrescens, subtus tomentosa, 7-nervia, nervis extimis submarginalibus, mediis paullo vel longe supra basin discedentibus; pedunculus ♂ umbellarum usque ad 4.3 cm. longus, teres, dense velutinus; receptaculum globosum, ca. 5 mm. diametro, bracteolis numerosis, densissime pubescentibus; pedicelli breves, 3-4 mm. longi, villosuli; perianthii segmenta linearia, 6 mm. longa et 1 mm. lata, supra medium recurvata, externe pubescentia; filamenta 4 mm. longa, antheris minoribus, ca. 1.2 mm. longis; flores ♀ desiderantur; pedunculus fructiferus variabilis, 6-15 mm. longus, nunc quam petiolus brevior nunc longior, teres, dense velutinus; pedicelli ca. 6 mm. longi, pubescentes; baccæ nigræ, subglobosæ, ca. 6 mm. diametro.

Type a staminate specimen in the U. S. National Herbarium, No. 567,216, collected at Finca Mexiquito, Chiapas, Mexico, July, 1913, by C. A. Purpus (No. 6930). Duplicates at F, G, Mo, Y.

RANGE: Southern Mexico, Guatemala, and British Honduras, near sea-level.

Other specimens examined:

GUATEMALA: Quiriguá, Izabal, *Standley* 23890 (G, US, Y).

BRITISH HONDURAS: Mountain Pine Ridge, El Cayo District, *Bartlett* 11681 (Mich, US), 11688 (Mich, US). Little Mountain Pine Ridge, El Cayo District, *Bartlett* 11879 (Mich, US). All Pines, *Schipp* 580 ♀ (B, BM, F, G, K, Mich, Mo, Y).

The present species has been misidentified as *Smilax tomentosa*, *S. mollis*, and *S. angustiflora*, but the densely lanate-tomentose stems are characteristic. Although the type differs in some respects from the other specimens cited, the differences are probably not important.

21. *Smilax candelariæ* A. DC. Monogr. Phan. 1: 70. 1878.

PLATE 7.

Upper stems terete, smooth, straight or subflexuous, densely short-pilose when young, at length glabrescent; petioles up to 1.4 cm. long, pubescent when young; lower leaves ovate, 18 cm. long and 10 cm. wide, the upper leaves oblong, 8 to 14 cm. long, 4 to 6 cm. wide, all coriaceous, short-

acuminate at apex, cordate or subcordate at base (or the uppermost merely rounded), entire, not lobed, unarmed, glabrous above, persistently pilosulous beneath, 7-nerved, the two outer nerves submarginal, the two inner arising above the base of the blade, all nerves and secondary veins deeply impressed above; flowers not known; peduncles of fruiting umbels solitary, axillary, 1 to 3 mm. long; receptacle globose, the bracteoles pubescent, united to form deep cups at the base of each pedicel; pedicels about 8 mm. long, stout, retrorsely hairy, bulbously enlarged at base; fruits bright red, about 12 mm. long and 9 mm. broad, acutish at apex and base.

RANGE: Mountains of Costa Rica.

Specimens examined:

COSTA RICA: Candelaria, *Hoffmann* in 1857 ♀ (F, photograph of type in Berlin Herbarium). Navarrito, alt. 1370 meters, *Stork* 2948 (F).

DeCandolle cites an additional specimen, *Jurgensen* 563, from Mexico, which we have not seen. It is perhaps misidentified.

22. *Smilax pringlei* Greenm. Proc. Amer. Acad. 34: 567. 1899.

Stems slender, terete, smooth, unarmed, when young pilosulous, soon glabrous; petioles up to 3 cm. long, hirsutulous toward apex, the free part articulate at or above the middle; leaf blades ovate or oblong, the lower up to 16 cm. long and 9.5 cm. wide, acute at apex, cordate at base, chartaceous, entire, not lobed, unarmed, light green above, pilosulous when young, soon glabrous, paler beneath, pilose throughout, usually glabrate at maturity except along the principal veins, these pilose, 7-nerved, the inner nerves usually arising above the base, the outermost submarginal, the secondary veins white, prominently reticulate; peduncles of ♂ umbels up to 8.5 cm. long, much longer than the subtending petioles, pilosulous; receptacle globose, the bracteoles densely hairy; pedicels 10 to 12 mm. long, slender, pilosulous; perianth segments 6.5 to 7 mm. long, 1.3 mm. wide, rather uniformly pilosulous without, not bearing an apical tuft of long hairs; filaments about 4 mm. long, the anthers much shorter, 1.5 to 1.8 mm. long; pistillate flowers unknown; fruiting peduncles up to 4.6 cm. long, flattened, at length glabrate; pedicels 9 to 10 mm. long; berries seemingly red, globose.

RANGE: Mexican central plateau and its borders, from 1800 to 2200 meters elevation.

Specimens examined:

"NUEVO LEÓN: Cerro Guadeloupe, Monterey, *Abbon* in 1909" (B).¹

SINALOA: San Ignacio, *Montes & Salazar* 845 (US).

JALISCO: Real Alto, Sierra Madre Occidental, *Mexia* 1728 (BM, F, Gen, Mo, US, Y).

STATE OF MEXICO: Pantoja, *Hinton* 3543 ♂ (K, US). San José, *Hinton* 293 ♀ (K).

MORELOS: Cuernavaca, *Pringle* 6843 ♂ ♀ (BM, Boiss, Brux, F, G, Gen, K, P, Mo, US, V, Y), 7060 ♀ (G, type, US), 7259 ♂ (G, US).

MICHOACÁN: Morelia, *Arsène* 6013 (G, Mo, US, Y).

¹These data are entirely doubtful. See note on this collection by Paul C. Standley in *Science* 65: 130. 1927.

Local names: "Granadilla" (Jalisco); "nitamo" (State of Mexico).

Standley¹ reduces *S. pringlei* to the synonymy of *S. mollis*, but although the two species are closely related they seem to us amply distinct. The perianth segments of the latter are usually only 4 mm. long (rarely 5) and are only sparingly hairy, or often glabrous without, but bear a conspicuous tuft of long hairs at the apex. On the contrary, the perianth segments of *S. pringlei* are 6.5 to 7 mm. long, are rather uniformly short-hairy without, and lack an apical tuft of hairs. The stems of *S. mollis* are persistently pubescent, only the oldest becoming glabrate, but the stems of *S. pringlei* are hairy only when young. Differences between the two species are also apparent in the leaves, those of *S. pringlei* being usually glabrous beneath at maturity except along the principal veins, in which respect they are similar to *S. mollis* var. *acuminata*. The secondary veins of *S. pringlei* are often white, thus making the reticulation of the leaves very noticeable. The two species differ also in range, *S. pringlei* being confined to the Mexican central plateau and *S. mollis* being found (in Mexico) only on the Atlantic watershed.

23. *Smilax angustiflora* A. DC. Monogr. Phan. 1: 67. 1878. PLATE 8.

Stems terete, unarmed, subtomentose; petioles up to 2 cm. long, tomentose; leaf blades ovate-oblong, 10 to 12 cm. long, 4 to 5 cm. wide, acute at apex, cordate at base, membranous, pale green, entire, unarmed, sparsely pilose above, persistently pilosulous beneath, 7-nerved, the inner nerves arising above the base; peduncles of ♂ umbels solitary, axillary, up to 2.5 cm. long, slightly longer than the subtending petioles, tomentose; pedicels 5 to 6 mm. long, densely tomentose; flower buds linear, about 8 mm. long and 1 mm. wide; perianth segments linear, 8 to 9 mm. long, 1 mm. wide, densely tomentose, especially toward base, lacking an apical tuft of hairs; filaments very slender, 5 to 6 mm. long, the anthers 1.5 to 2 mm. long; pistillate specimens not known.

Specimens examined:

COSTA RICA: Alto de la Cruz, near Azarí, *Hoffmann* 575 ♂ (B, type, Gen, fragment).

Despite the large number of specimens recently collected in Costa Rica, the present species has not been rediscovered. It resembles *S. mollis*, but the large tomentose flowers preclude its reference to that species.

24. *Smilax gymnopoda* Apt, Repert. Sp. Nov. Fedde 18: 401. 1922.

Stems terete, unarmed, subtomentose; petioles up to 18 mm. long, tomentose, the free part articulate at the middle; lower leaf blades broadly ovate or rarely oblong, up to 17 cm. long and 10 cm. wide, the upper much smaller, oblong or oblong-lanceolate, all acute at apex, cordate at base, membranous or subchartaceous, entire, not lobed, unarmed, hirsutulous or subtomentose above when young, soon glabrous, persistently subtomentose beneath, 7-

¹Contr. U. S. Nat. Herb. 23: 102. 1920.

nerved, the outer nerves submarginal, the inner arising at the base; peduncle of ♂ umbel solitary, axillary, up to 6.5 cm. long, much longer than the subtending petiole, subtomentose; receptacle globose, 4.5 to 6 mm. in diameter, the bracteoles numerous, densely hairy; pedicels up to 1 cm. long, glabrous, apparently colored; perianth segments linear-oblong, 4 to 5 mm. long and 1.5 mm. broad, essentially glabrous but bearing a few long hairs at apex; filaments erect, 2.5 to 3.5 mm. long, fleshy, the anthers much shorter, 1.2 to 1.5 mm. long; peduncles of ♀ umbels up to 2.7 cm. long, flattened, subtomentose; pedicels 7 mm. long, bearing a few scattered long hairs; perianth segments oblong-lanceolate, about 3.2 mm. long; staminodia 3, subulate; styles 3; fruiting peduncles obviously flattened, up to 4 cm. long; fruiting pedicels about 1 cm. long; berries globose, about 6 mm. in diameter, shining; seeds dark, rugulose, about 5 mm. long.

RANGE: Tropical eastern Mexico, at middle elevations.

Specimens examined:

MEXICO: Huitamalco, *Liebmann* 14675 (F, US), 14677 (F).

VERACRUZ: Jalapa, alt. 1200 meters, *Pringle* 8130 ♂ (type collection; BM, Boiss, Brux, F, G, Gen, K, Mo, P, US, V, Y), 8176 ♂ ♀ (Boiss, F, G, Gen, K, Mo, US, Y); *Halsted* 40 ♀ (Y). Tantoyuca, Huasteca, *Ervendberg* 325 ♂ (G).

A critical species, perhaps not sufficiently different from *S. mollis*. It is difficult to find key characters to separate the two; yet when, as sometimes happens, both species are present in a single collection, they may be distinguished at a glance by one familiar with them. From the Mexican specimens of *S. mollis* the present species may be told by its subtomentose rather than merely hirsutulous stems. The stem hairs of *S. gymnopoda* are longer and at least part of them are tangled and subappressed, whereas those of typical Mexican specimens of *S. mollis* are always distinct and spreading. This difference is not maintained, however, in the large series of Central American specimens of *S. mollis*. The character on which *S. gymnopoda* was differentiated by Apt, namely the glabrous pedicels, is not distinctive, such pedicels being often found in true *S. mollis*.

25. *Smilax mollis* H. & B. ex Willd. Sp. Pl. 4: 785. 1806.

Smilax ovata Sessé & Moc. Fl. Mex. ed. 2, 232. 1894. A specimen, presumably type material, has been examined in the Boissier Herbarium. It is typical *Smilax mollis*.

Stems terete, unarmed, pilosulous or subtomentose; petioles up to 1.8 cm. long, densely pubescent, the free part articulate at or above the middle; lower leaf blades ovate-oblong or broadly oval, up to 18 cm. long and 10.5 cm. broad, the upper much smaller, ovate, oval, or oblong, all acute or apiculate at apex, cordate at base, membranous, entire, not lobed, unarmed, deep or pale green, sparsely hirsutulous above when young, soon glabrous and shining, persistently hirsutulous on the veins beneath, 7-nerved, the nerves all arising from the base, the two outermost submarginal, the secondary veins prominently reticulate; peduncle of ♂ umbel up to 4 cm. long, much longer than the subtending petiole, terete, densely short-hirsute; receptacle large, globose, the bracteoles numerous, densely pubescent; pedi-

cels 3 to 4 (rarely 5) mm. long, hirsutulous or rarely glabrous; perianth segments oblong-linear, about 4 (rarely up to 5) mm. long, and 1 mm. wide, sparingly hairy or glabrous except for a tuft of long hairs at the apex; filaments slender, 2 to 3.5 mm. long, the anthers much shorter, 1 to 1.2 mm. long; peduncles of ♀ umbels up to 3 cm. long, terete or slightly flattened, densely short-hirsute, usually longer than the subtending petioles; pedicels 3 to 5 mm. long, hirsutulous; perianth segments narrowly oblong, about 3.2 mm. long, glabrous except for a tuft of hairs at the tip; staminodia 3, about 1 mm. long; styles 3, short, erect; berries red or yellow, globose, 4 to 8 mm. in diameter.

RANGE: Tropical eastern Mexico, at low elevations, and throughout Central America, ascending to 2000 meters altitude in Costa Rica.

Specimens examined:

MEXICO: *Sessé & Mociño* (Boiss, type collection of *S. ovata?*); *Müller* 223 (Y); *Schaffner* 180 (B); *Sartorius* (B).

TAMAULIPAS: San Lucas, *Von Rozynski* 715 (F); *Viereck* 574 (B).

VERACRUZ: Jalapa, *Humboldt & Bonpland* (P, type collection); *Schiede & Deppe* 988 (B, BM). Orizaba, *Botteri* 973 (BM, Gen, K, P, V). Mirador, *Liebmann* 14673 (F), 14673a (F). Papantla, *Liebmann* 14672 (F). Veracruz, *Greenman* 116 (F). Zacuapán, *Purpus* in 1917 (B), 2011 (B, F, G, Gen, Mo, US, Y), 14041 (F, K, Mich, Mo). Huatusco, *Conzatti* 843 (G).

CHIAPAS: Monserrate, *Purpus* 10094 (US).

CAMPECHE: Tuxpeña, *Lundell* 1249 (F, Mich, US).

YUCATAN: *Gaumer* 24276 (F, Mo), 24401 (F, US).

BRITISH HONDURAS: El Cayo, *Bartlett* 11943 (Mich); *Chanek* 5 (Mich, US). Honey Camp, *Lundell* 355 (K, US, Y), 412 (F, US), 524 (BM, F, K, Mo, US, Y). Corozal, *Lundell* 4984 (Mich, Mo, US); *Gentle* 196 (US), 456 (US), 1103 (US). El Dorado, *Schipp* 392 (F). Fern Hill, *Schipp* 1059 (F, K, Mich, Mo, Y).

GUATEMALA: Uaxactun, Petén, *Bartlett* 12331 (F, Mich, US). La Libertad, Petén, *Lundell* 2834 (Mich, US), 2858 (Mich, US), 3066 (Mich, US), 3473 (Mich, US). Finca Sepacuité, Alta Verapaz, *Cook & Griggs* 764 (US).

HONDURAS: Tela, *Standley* 53087 (F, US), 53690 (F, US), 54500 (F, US). Puerto Sierra, *Wilson* 56 (Y). San Pedro Sula, *Bangham* 594 (F, US).

COSTA RICA: Cerro de Piedra Blanca, San José, *Standley* 32572 (US). Aserri, San José, *Standley* 34197 (US). Cerro de la Carpintera, Cartago, *Standley* 34363 (US). El Muñeco, Cartago, *Standley & Torres* 51736 (US). Cartago, *Stork* 370 (Mich, US). Cañas Gordas, *Pittier* 11074 (US). Volcán de Poás, *Standley* 34648 (US). Volcán de Irazú, *Lankester* 677 (US). Livingston, *Rowlee & Stork* 717 (US, Y).

PANAMA: Penonome, *Williams* 610 (US, Y). Gatun, *Hayes* 209 (Y). Fort Randolph, *Standley* 28685 (US). Fort Sherman, *Standley* 31103 (US). France Field, *Standley* 30310 (US). Obispo, *Standley* 31754 (US). Barro Colorado Island, *Standley* 31431 (US), 40829 (US), 40956 (US); *Aviles* 34 (F); *Starry* 165 (F); *Shattuck* 673 (F); *Woodworth & Vestal* 674 (F); *Bangham* 491 (F).

Local name: "Pate" (Honduras).

25a. *Smilax mollis* var. *acuminata* A. DC. Monogr. Phan. 1: 68. 1878.

Differs from the typical variety in having the leaves glabrous beneath at maturity, except for a few persistent hairs along the midrib. The fruiting peduncles are often shorter than the subtending petioles.

RANGE: Tropical eastern Mexico, at middle elevations.

Specimens examined:

TAMAULIPAS: Gómez Fárias, *Palmer* 286 (F, G, Mo, US, Y). San Lucas, *Viereck* 168 (B).

VERACRUZ: Orizaba, *Bourgeau* 3038 ♀ (type collection; K, P). Atoyac, *Kerber* 188 (B, BM, Boiss, F, fragment ex Herb. Leningrad, Gen, K, P, US, V).

25b. *Smilax mollis* var. *hirsutior* Killip & Morton, var. nov.

A var. *typica* caulibus folisque hirsutioribus pilis longissimis flavidis, floribus ♂ magnis plus quam 5 mm. longis differt.

Type in the U. S. National Herbarium, No. 937,827, collected at Río Turrialba, Prov. Cartago, Costa Rica, alt. 480 meters, March, 1894, by John Donnell Smith (No. 4971). Duplicate in the Gray Herbarium.

SPECIES OF DOUBTFUL AFFINITY

26. *Smilax acutifolia* Schlecht. *Linnæa* 18: 449. 1844.

PLATE 9.

Smilax invenusta Kunth, Enum. 5: 234. 1850. Type in the Berlin Herbarium, collected at El Banco, Mexico, by Ehrenberg. This locality is not found on any map available to us. We have nothing to add to the excellent description of the type specimen by Apt, except that the bractlets of the fruiting receptacle are united into a deep cup at the base of each pedicel and are similar to those of *Smilax lanceolata*.

Schlechtendal founded his species on specimens collected at Anganguero, Mexico, by Schiede and Deppe and cited also a specimen collected at El Banco by Ehrenberg. Neither of these has been studied, but it may be surmised that the Ehrenberg collection is part of the same material as that on which *S. invenusta* was based, inasmuch as the description by Schlechtendal agrees in every particular with the type specimen of *S. invenusta*. The latter is not exactly matched by any other material seen by us, yet offers no truly distinctive characters by which it can be separated.

27. *Smilax bernhardi* Apt, Repert. Sp. Nov. Fedde 18: 418. 1922.

From the description, which was based on a cultivated plant growing in the Botanical Garden at Berlin-Dahlem, we are not able to place this species satisfactorily. The material is said to have been grown from seeds received from Costa Rica.

28. *Smilax glaucocarpos* Schlecht. *Linnæa* 18: 450. 1844.

The type material (not examined) was collected by Ehrenberg at Hacienda del Carmen and at Mineral del Monte, Mexico. From the description, the species can not be definitely identified.

29. *Smilax lappacea* H. & B. ex Willd. Sp. Pl. 4: 777. 1806.

Collected by Humboldt and Bonpland "In Caracas ad fluvium Anauco." A specimen of the type collection has been studied and photographed by the senior author.

29a *Smilax lappacea* var. *ornata* Killip & Morton, var. nov. PLATE 10.

Caules inferiores subteretes, læves, glabri, superiores obtuse quadrangulati, læves, aculeis satis magnis compressis armati; petioli 5-6 mm. longi, spinulis paucis armati, partis liberæ apicem versus articulati; lamina foliorum lineari-lanceolata, usque ad 11.5 cm. longa et 2.5 cm. lata, apice acuminata, basi acuta, membranacea, concolor, supra lævis, subtus nervo mediano aculeis magnis rectis pallidis armata, venis secundariis valde reticulatis spinulis flaccidis numerosis praeditis, margine spinulosa, 5-nervia, nervis exterioribus marginalibus; flores et fructus desiderantur.

Type in the U. S. National Herbarium, No. 1,084,293, collected at Gamboa, Canal Zone, April 9, 1921, by Bro. Heriberto (No. 71).

Differs from the typical variety in the numerous setiform spinules adorning the veins and veinlets on the under surface of the leaves.

30. *Smilax luculenta* Killip & Morton, sp. nov. PLATE 11.

Caules lignosi teretes, sulcati, glabri, aculeis compressis parvis curvatis parce armati; petiolus usque ad 2 cm. longus, tortus, partis liberæ basin versus articulatus; lamina foliorum oblango-lanceolata, maxima ca. 18 cm. longa et 10 cm. lata, apice obtusa vel vix acuta, laminis inferioribus basi cordatis, superioribus basi acutis, coriacea, inermis, glabra, integra, non lobata, 5-nervia, nervis utrinque inconspicuis, elevatis; flores ignoti; pedunculus fructiferus 2.5-4 mm. longus, compressus, petiolo multo brevior; receptaculum globosum, 3-3.5 mm. diametro, bracteolis parvis apiculatis glanduloso-denticulatis praeditum; pedicelli gracillimi, 6-9 mm. longi, angulati, basi bulboso-inflati, apice disciformes; baccæ nigrae vel atropurpureæ, globosæ, 5-9 mm. diametro.

Type a pistillate specimen in the U. S. National Herbarium, No. 1,408,214, collected near Tela, Dept. of Atlántida, Honduras, in thicket near beach, Dec. 14, 1927-Mar. 15, 1928, by Paul C. Standley (No. 54275). Duplicate at F.

RANGE: Honduras, near sea-level.

Other specimens examined:

HONDURAS: Progreso, Yoro, *Standley* 55107 (F, US). Tela, *Yuncker* 4808 (F, Mich).

Local name: "Corona de Cristo."

Although neither male nor female flowers are present, the specimens are so different from any species known from Central America that we do not hesitate to describe this as new. Distinctive are the large, coriaceous, unarmed, cordate-based leaves with elevated nerves and obscure secondary veins, the very short peduncles, and the long slender pedicels. *S. luculenta* differs from almost all of the other species discussed in this paper in having the petioles articulate near the very base of the free part.

31. *Smilax multiflora* Mart. & Gal. Bull. Acad. Sci. Brux. 9²: 390. 1842.

Described from *Galeotti* 5475, collected near Chinantla, Mexico. The type could not be located in the herbarium at Brussels, so, for the present, this species must remain uncertain.

32. *Smilax parvifolia* Sessé & Moc. Fl. Mex. ed. 2, 232. 1894.

A Mexican species not definitely identifiable from the short description, but perhaps referable to *Smilax spinosa* Mill.

33. *Smilax pavoniana* (A. DC.) Apt, Repert. Sp. Nov. Fedde 18: 400. 1922.

Smilax mollis var. *pavoniana* A. DC. Monogr. Phan. 1: 68. 1878. Founded on a Mexican specimen in the Boissier Herbarium (Herb. Pavon; collected by Sessé & Mociño?).

From a photograph of the type we are not able to place this species definitely. The specimen cited by Apt, namely *Abbon* s. n., from "Nuevo León," is *S. pringlei*.

SPECIES DOUBTFULLY OR ERRONEOUSLY REPORTED FROM MEXICO

SMILAX BERTERII Spreng. Syst. Veg. 2: 102. 1825.

Reported from Mirador, Veracruz, by Martens and Galeotti on the basis of *Galeotti* 5481. This species is considered by Schulz as synonymous with *Smilax domingensis* Willd. and it is therefore likely that the specimen cited is to be referred to *S. lanceolata* L.

SMILAX CADUCA L. Sp. Pl. 1030. 1753.

Reported from Mexico by Sessé and Mociño, probably in error.

SMILAX COGNATA Kunth, Enum. 5: 175. 1850.

Based upon material from Puerto Alegre, a locality said by Kunth to be in Mexico. No such locality is known in Mexico and the species is doubtless Brazilian.

SMILAX HAVANENSIS Jacq. Enum. Pl. Carib. 33. 1760.

Reported from Mexico by Martens and Galeotti and by A. DeCandolle on the basis of *Galeotti* 5480 from Veracruz. A specimen of this number, kindly lent to us by the Jardin de l'Etat, Brussels, is sterile and in poor condition. It is not *S. havanensis* Jacq. nor any of the species treated in the present paper. Very likely it represents an undescribed species as yet not re-collected.

SMILAX HISPIDA Muhl. ex Torr. Fl. New York 2: 302. 1843.

Reported doubtfully by Hemsley, on the basis of a cultivated specimen said to have come from Mexico. The record is probably erroneous.

SMILAX LAURIFOLIA L. Sp. Pl. 1030. 1753.

Ascribed to Mexico by Sessé and Mociño, almost certainly in error.

SMILAX OFFICINALIS H.B.K. Nov. Gen. et Sp. 1: 271. 1815.

Reported from Mexico by Presl, probably in error. Reported from Chiriquí, Panama, by A. DeCandolle on the basis of *Warszewicz* 2. We have not seen the specimen.

SMILAX PAPYRACEA Duham. Trait. Arb. 2: 242. 1801.

Reported from the Volcán del Fuego, Guatemala, by Hemsley. The record must be considered doubtful.

SMILAX PSEUDOCHINA L. Sp. Pl. 1031. 1753.

Reported from Mexico by Sessé and Mociño, perhaps on the basis of specimens of *S. pringlei*. Also reported by Martens and Galeotti from Mt. Orizaba, Mexico, on the basis of *Galeotti* 5476, which is *Smilax moranensis*.

SMILAX ROTUNDIFOLIA L. Sp. Pl. 1030. 1753.

Reported from Mexico by A. DeCandolle on the basis of a specimen marked "*Smilax tamnoides*, Nueva España, Herb. Pavon," presumably collected by Sessé and Mociño. We have examined a photograph of this and are unable to identify it with any of the species described in this paper. It is, however, certainly not referable to either *S. rotundifolia* or *S. tamnoides*. A. DeCandolle referred also to *S. rotundifolia* an unnumbered Mexican specimen collected by Hahn. This is referable to *S. aristolochiaefolia* Mill., being the form described as *S. medica* var. *bracteata* A. DC.

SMILAX TAMNOIDES L. Sp. Pl. 1030. 1753.

Reported from Mexico by Sessé and Mociño. See note under *Smilax rotundifolia* L.

SMILAX TETRAGONA L. f. Suppl. 427. 1781.

Reported from Mexico by Martens and Galeotti on the basis of *Galeotti* 5478, from Jalapa, Veracruz. The specimen is *Smilax bona-nox* L.

SMILAX TOMENTOSA H.B.K. Nov. Gen. & Sp. 1: 272. 1815.

This South American species has often been reported from our region, but all the specimens so identified have been found to belong to other species, chiefly *S. subpubescens* and *S. velutina*.

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- 26670. spinosa
- 30310. mollis
- 30633. lanceolata
- 31103. mollis
- 31295. spissa
- 31314. spissa

STANDLEY, P. C.—(Continued)

- 31431. mollis
- 31754. mollis
- 31872. spinosa
- 32512. lanceolata
- 32572. mollis
- 33154. kunthii
- 33277. spinosa
- 34197. mollis
- 34363. mollis
- 34515. spinosa
- 34648. mollis
- 34653. spinosa
- 40060. spinosa
- 40245. spinosa
- 40796. spissa
- 40820. spissa
- 40829. mollis
- 40956. mollis
- 43991. subpubescens
- 47359. spinosa
- 52745. regelii
- 53087. mollis
- 53257. regelii var. albida
- 53690. mollis
- 54275. luculenta
- 54318. regelii
- 54500. mollis
- 55107. luculenta
- 56852. panamensis

STANDLEY, P. C., & TORRES, R.

- 47984. vanilliodora
- 51736. mollis

STANDLEY, P. C., & VALERIO, J.

- 45537. standleyi
- 45693. spinosa
- 45732. spinosa
- 45777. vanilliodora
- 46136. standleyi
- 46151. standleyi
- 46308. standleyi
- 47188. panamensis
- 49003. vanilliodora
- 49038. kunthii
- 50218. spinosa
- 50770. kunthii

STARRY, D. E.

- 165. mollis

STORK, H. E.

- 370. mollis
- 561. engleriana
- 1092. engleriana
- 1310. engleriana
- 1337. spinosa
- 1811. subpubescens
- 2948. candelariæ

TONDUZ, A.

- 2233. vanilliodora
- 6612. spissa
- 7224. spissa
- 7325. spinosa
- 7993. spinosa
- 9242. panamensis
- 9516. vanilliodora
- 9886. spissa
- 10769. subpubescens
- 11732 p.p. engleriana
- 11732 p.p. subpubescens
- 11803. subpubescens
- 13303. engleriana
- 13725. spinosa
- 13984. spinosa
- 14639. vanilliodora
- 17723. panamensis
- 17724. panamensis
- 17726. panamensis

TRELEASE, W.

- 153. bona-nox

TÜRCKHEIM, H. VON

- 890. jalapensis
- 8765. subpubescens
- II.988. subpubescens
- II.1352. subpubescens
- II.1701. panamensis
- II.2218. jalapensis var. botterii

UHDE, C. A.

- 159. moranensis

VALERIO, J.

- 97. panamensis
- 896. spinosa

VIERECK, H. W.

- 168. mollis var. acuminata
- 574. mollis
- 621. jalapensis

WAGNER

- 630. spinosa

WATSON, S.

- 327. regelii

WAWRA, H. R.

- 8. lanceolata
- 890. lanceolata

WETMORE, R. H., & ABBE, E. C.

- 168. panamensis

WETMORE, R. H., & WOODWORTH, R. H.

- 49. spissa

WILLIAMS, R. S.

- 241. spinosa
- 610. mollis

WILSON, P.

- 56. mollis
- 66. panamensis
- 354. regelii
- 617. regelii
- 622. lanceolata
- 636. regelii

WOODWORTH, R. H., & VESTAL, P. A.

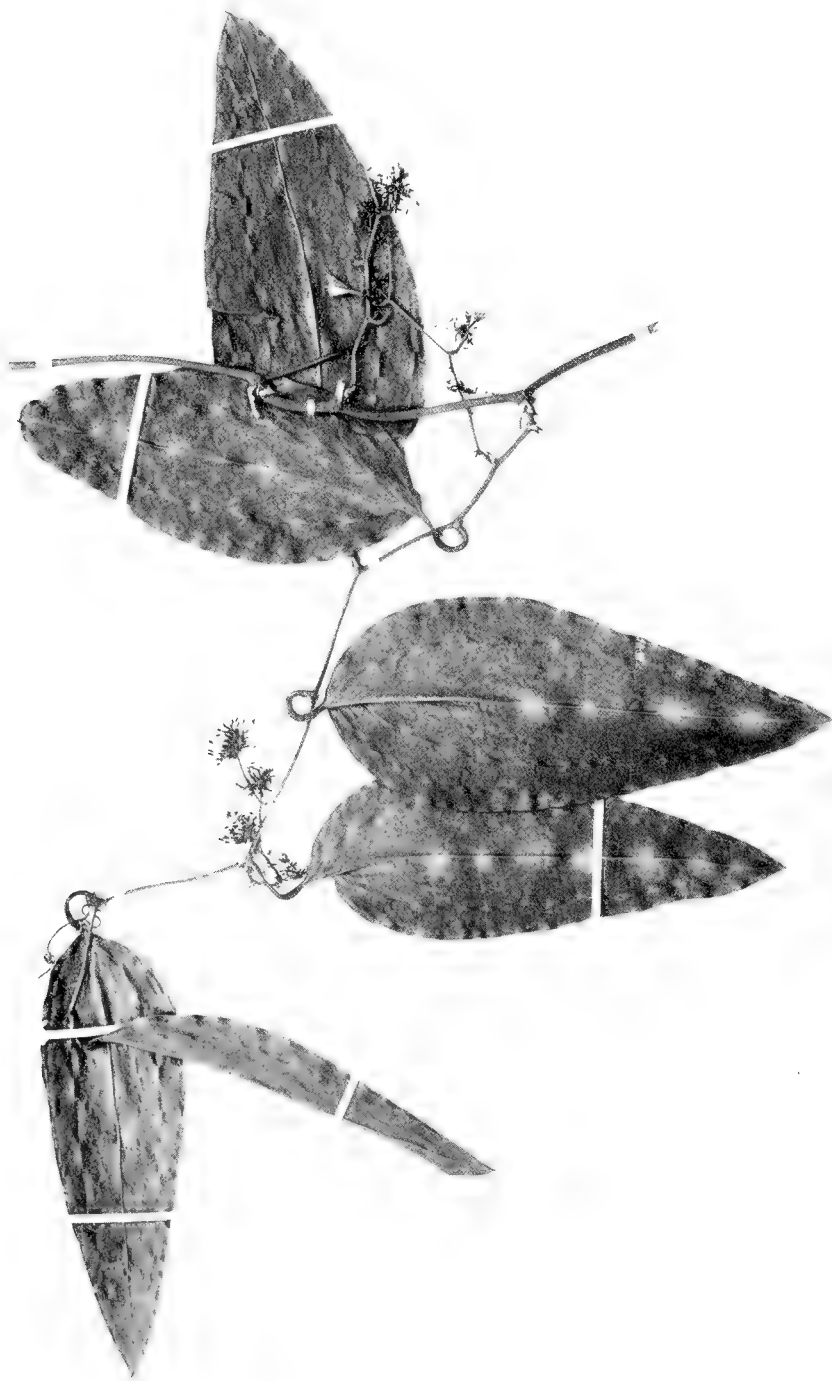
- 674. mollis

YUNCKER, T. G.

- 4776. panamensis
- 4808. luculenta



Smilax spinosa Mill. Collected by Beechey; type specimen of *S. obtusa* Benth., in the Kew Herbarium. Half natural size.



Smilax lundellii Killip & Morton. Type specimen (Lundell 3190), in the U. S. National Herbarium. Half natural size.



Smilax munda Killip & Morton. Type specimen (*Schipp* 1181), in Field Museum. Half natural size.



Smilax vanilliodora Apt. Type specimen, collected by Gómez, in the Berlin Herbarium.
Half natural size.



Smilax bona-nox L. Type specimen of *S. cordifolia*, collected by Humboldt & Bonpland, in the Paris Herbarium. Half natural size.



Smilax subpubescens A. DC. Type specimen (*Bourgeau* 2578), in the Paris Herbarium.
Half natural size.



Smilax candelaria A. DC. Type specimen, collected by Hoffmann, in the Berlin Herbarium. Half natural size.



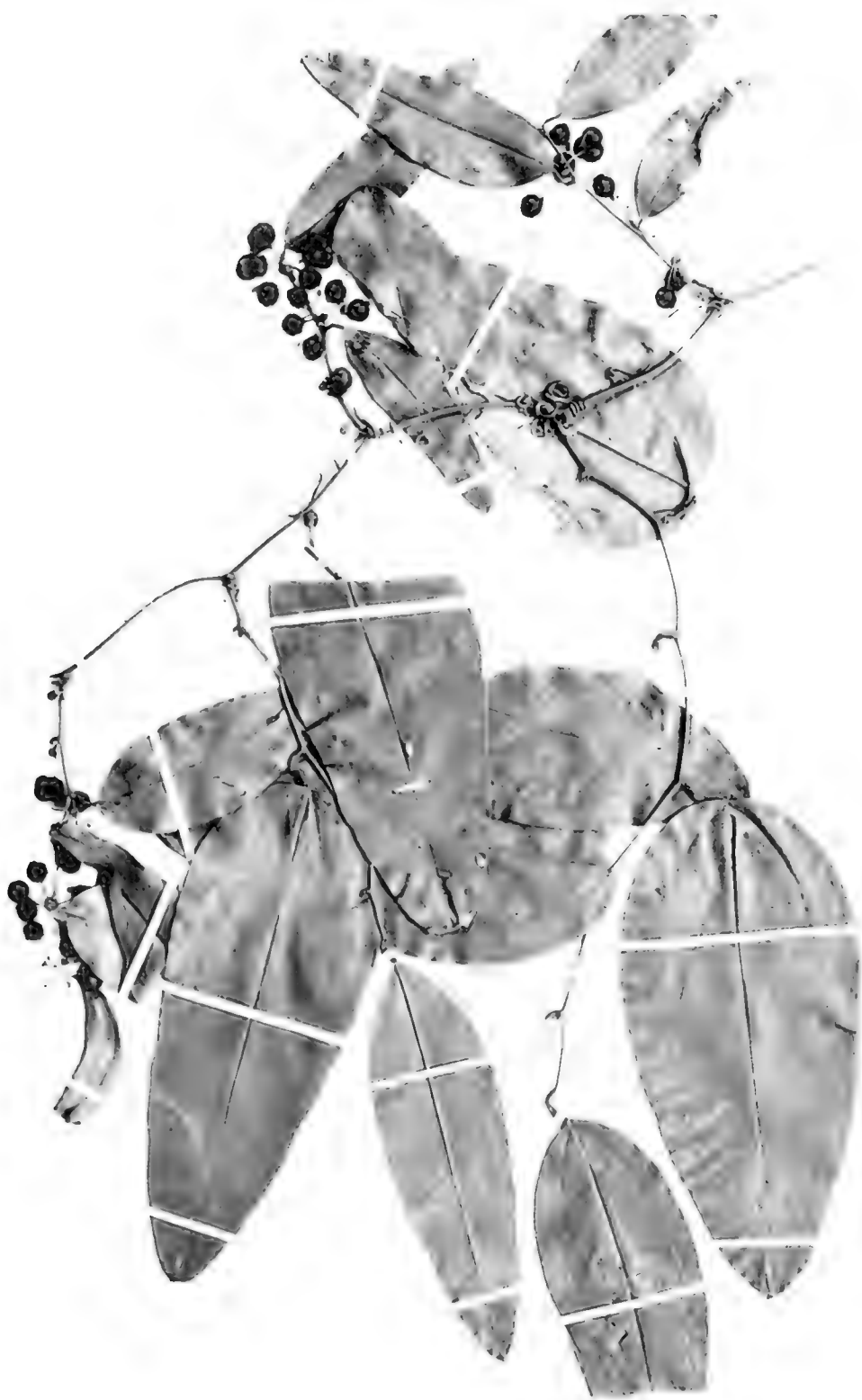
Smilax angustiflora A. DC. Type specimen (*Hoffmann 575*), in the Berlin Herbarium.
Half natural size.



Smilax acutifolia Schlecht. Ehrenberg 940, type specimen of *S. invenusta* Kunth, in the Berlin Herbarium. Half natural size.



Smilax lappacea var. *ornata* Killip & Morton. Type specimen (*Heriberto* 71), in the U. S. National Herbarium. Half natural size.



Smilax luculenta Killip & Morton. Type specimen (Standley 54275), in the U. S. National Herbarium. Half natural size.

MAYA BOTANY: MISCELLANEOUS PAPERS

XIII

PASSIFLORACEÆ OF THE MAYAN REGION

BY E. P. KILLIP
U. S. National Museum

With two plates.

[Issued September 30, 1936]

PASSIFLORACEÆ OF THE MAYAN REGION ¹

The family Passifloraceæ consists of twelve genera, four of which are found in the New World. By far the largest of these is *Passiflora*, the only one occurring in the Mayan region. It is essentially an American genus, as less than 20 of the approximately 350 known species are endemic in the Old World.

In the area included in the present survey, the Mexican states of Veracruz, Campeche, Tabasco, and Yucatan, British Honduras, Guatemala, Honduras, and El Salvador, there are 42 species. Most of them belong to the subgenus *Plectostemma*, which has relatively small, not highly colored flowers. *Granadilla*, the subgenus to which many of the showiest passion-flowers belong, is represented by 10 species.

With possibly one exception all the Mayan species are herbaceous vines, climbing by means of tendrils. The stipules vary from setaceous to broadly ovate; in one subgenus, *Dysosmia*, they are in the form of a half-ring surrounding one side of the stem. The leaves are always alternate, but probably in no group of plants is their shape more striking or the variation in outline of those of a single plant more extreme than in *Passiflora*. In three Mayan species, *P. suberosa*, *P. biflora*, and *P. fœtida*, this variation is especially pronounced. In all but a few species nectar-secreting glands are present in some form, either as protuberances on the petioles or along the margin of the bracts, or as ocellæ on the under side of the leaves. The bracts, which are present in all but a few species, are setaceous or narrowly linear—in which case they are usually scattered along the peduncle,—or they are leaf-like, forming an involucre. In *Dysosmia* they are repeatedly pinnatisect.

The structure of the flowers is complicated. There are five sepals and five petals, though the latter are absent in some species. On the inside of the flower tube, or receptacle, which is cup-shaped or bowl-shaped in most Mayan species, there are one or more series of filaments (the corona), the outermost of which is borne near the throat of the tube. Within the corona are a membranous ring (operculum), a low circular ridge (nectar ring), and the limen, an organ of variable form. The genital organs are borne on a slender stalk (gynophore). Contrary to popular impression, the name "passionflower" is derived from a fancied resemblance of the gynophore, ovary, stamens and styles to the Cross, the corona suggesting a crown of thorns.

Several species of *Passiflora* are cultivated, some for the beauty of their flowers, others for the fruits, the pulp of which is eaten cooked or usually uncooked, or is used in making drinks or ices.

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All the specimens cited in the following descriptive account of the species I have seen, having had the privilege of examining the material of most of the important collections in the United States and Europe. In the case of the commoner species the precise localities at which the specimens were collected are omitted.

KEY TO THE SPECIES

- Flower tube cylindric, subequaling the sepals..... 1. *P. viridiflora*
 Flower tube campanulate, much shorter than the sepals.
 a. Bracts, if present, not involucrate, usually setaceous and scattered along the peduncle; flowers rarely more than 4 cm. wide when expanded, not highly colored.
 Petioles glandular; seeds reticulate or punctate.
 Petals none.
 Stipules ovate 2. *P. trinifolia*
 Stipules narrowly linear or setaceous.
 Leaves longer than broad, entire or 3-lobed, not peltate, pubescent or glabrous..... 3. *P. suberosa*
 Leaves much broader than long or subrotund, peltate.
 Peduncles not more than 1.5 cm. long; leaves transversely oblong-elliptic, green beneath..... 4. *P. coriacea*
 Peduncles more than 1.5 cm. long; leaves subrotund, glaucous beneath 5. *P. clypeophylla*
 Petals present.
 Leaves 3- or 5-lobed.
 Stipules filiform; peduncles 2-4-flowered..... 6. *P. holosericea*
 Stipules semi-ovate or semi-orbicular; peduncles 1-flowered.
 Bracts more than 3 mm. wide, lacinate or irregularly lobed.
 Glands borne near apex of petiole; bracts lacinate; leaves 3- or 5-lobed; fruit globose..... 7. *P. adenopoda*
 Glands borne below middle of petiole; bracts irregularly few-lobed; leaves subhastate; fruit narrowly and acutely obpyriform..... 8. *P. dolichocarpa*
 Bracts narrower, entire.
 Glands borne near apex of petiole; middle leaf-lobe ovate; ovary pubescent..... 9. *P. morifolia*
 Glands borne near middle of petiole; middle leaf-lobe deltoid; ovary glabrous..... 10. *P. sicyoides*
 Leaves not lobed..... 11. *P. obovata*
 Petioles glandless; seeds transversely grooved.
 Peduncles more than 1-flowered..... 12. *P. sexflora*
 Peduncles 1-flowered.
 Plant glabrous or minutely puberulent; bracts present (wanting in *P. filipes*); fruit globose or ovoid, the transverse ridges of the seeds furrowed or rugulose.
 Bracts none; peduncles very slender, divaricate, more than 4 cm. long..... 13. *P. filipes*
 Bracts present, though often soon deciduous; peduncles stouter, usually less than 4 cm. long.
 Leaves ovate-oblong or suborbicular in general outline, 3-lobed at apex, the middle lobe prominent..... 14. *P. trisetosa*
 Leaves variable, deeply bilobed or, if subentire or 3-lobed, broader than long.
 Corona filaments in a single series.
 Flowers about 1.5 cm. wide, the corona filaments linear-clavate, about 2 mm. long..... 15. *P. ornithoura*

- Flowers larger, the corona filaments filiform,
about 10 mm. long.....16. *P. salvadorensis*
- Corona filaments in 2 series.
- Gynophore about 1 cm. long; peduncles soli-
tary; corona filaments not dilated.....17. *P. yucatanensis*
- Gynophore 5-8 mm. long; peduncles in pairs;
outer corona filaments dilated at middle.....18. *P. biflora*
- Plant pubescent; bracts none; fruit elliptic-ovoid or
fusiform, rarely ovoid, the transverse ridges of the
seeds smooth
- Leaves not lobed.
- Corona filaments linear-clavate; leaves attenuate-
acuminate, finely pilosulous beneath.....19. *P. cobanensis*
- Corona filaments subulate; leaves acute or acumin-
ate, softly velutinous beneath.....20. *P. brevipes*
- Leaves lobed.
- Stem and leaves hirsute with brownish hairs; leaves
rounded at base.....21. *P. costaricensis*
- Stem and leaves short-grayish-pubescent or tomen-
tulous.
- Flowers less than 2 cm. wide; leaves subtruncate
at upper margin.....22. *P. konzattiana*
- Flowers more than 2 cm. wide; leaves usually
deeply bilobed.
- Peduncles borne in pairs in the axils of the
main stem or usually on short axillary
branches; leaves longer than broad, the lobes
suberect.....23. *P. rovirosæ*
- Peduncles solitary in the leaf axils of the main
stem; leaves broader than long, the lobes
divergent.....24. *P. capsularis*
- a. Bracts involucrate, at least 8 mm. wide, entire or pinnati-
sect; flowers usually more than 4 cm. wide when expanded,
often highly colored.
- Leaves lunately bilobed.....25. *P. pulchella*
- Leaves otherwise.
- Bracts entire.
- Corona filaments in 2 series; operculum plicate.
- Leaves not peltate; plant densely pubescent.....26. *P. porphyretica*
- Leaves peltate; plant glabrous.
- Flowers red; leaves orbicular in general outline, ob-
scurely 3-lobed at apex.....27. *P. membranacea*
- Flowers white; leaves broadly ovate in general out-
line.
- Stipules setiferous-toothed; bracts less than 3 cm.
long, denticulate toward base.....28. *P. hahnii*
- Stipules crenate; bracts more than 3 cm. long, en-
tire.....29. *P. cookii*
- Corona filaments in several series, the 2 outer radiate,
the others much reduced, in *P. seemanni* mere tu-
bercles on the inside of the flower tube.
- Stem quadrangular, the angles winged.....30. *P. quadrangularis*
- Stem terete or angular, not winged.
- Bracts connate, at least at the base, more than 2 cm.
long, enveloping the young flower.
- Petiole glands liguliform or filiform, at least 3
mm. long.....31. *P. ligularis*
- Petiole glands saucer-shaped.
- Glands borne near base of petiole; leaves 3-
lobed.....32. *P. platyloba*

- Glands borne near apex of petiole; leaves normally entire.
- Stipules oblanceolate; operculum filamentose; leaves rounded or shallowly cordate at base 33. *P. nelsoni*
- Stipules linear; operculum denticulate; leaves deeply cordate, the basal lobes overlapping 34. *P. seemanni*
- Bracts free to base.
- Stipules linear or filiform.
- Bracts oblong-lanceolate, not more than 1 cm. wide; plant hirtellous 35. *P. serratifolia*
- Bracts ovate or ovate-lanceolate, more than 1 cm. wide; plant essentially glabrous.
- Leaves unlobed, entire at margin; ovary tomentose 36. *P. ambigua*
- Leaves 3-lobed, serrulate; ovary glabrous 37. *P. prolata*
- Stipules semi-ovate or semi-oblong.
- Leaves always 3-lobed; corona white; operculum denticulate; peduncles 4-6 cm. long 38. *P. subpeltata*
- Leaves polymorphic, unlobed to 3-lobed; corona purple; operculum filamentose; peduncles 2-4 cm. long 39. *P. ærstedii*
- Bracts 2-4-pinnatisect, the ultimate segments filiform, gland-tipped.
- Leaves not lobed, coriaceous or subcoriaceous, the nerves impressed above 40. *P. urbaniana*
- Leaves lobed, usually membranous, the nerves not impressed.
- Petals linear, more than twice as long as the outermost corona filaments; gynophore at least 2 cm. long 41. *P. palmeri*
- Petals oblong or oblong-lanceolate, less than twice as long as the outermost corona filaments; gynophore less than 2 cm. long 42. *P. fœtida*

PASSIFLORA L.

1. *Passiflora viridiflora* Cav. Icon. Pl. 5: 15. pl. 424. 1799.

Passiflora tubiflora H.B.K. Nov. Gen. & Sp. 2: 139. 1817.

Plant glabrous throughout; stipules linear-lanceolate, about 5 mm. long; petioles up to 6 cm. long, biglandular near middle; leaf blades 4-7 cm. long, 6-9 cm. wide (extremes up to 16 cm. long and 25 cm. wide), deeply 3-lobed (lobes ovate, ovate-oblong, or occasionally suborbicular, obtuse or rounded, rarely subacute, the middle lobe narrowed at its base, the lateral lobes widely divergent), peltate, coriaceous; peduncles solitary or in pairs, 1-2 cm. long; bracts none; flowers green, the tube cylindric, 1-1.5 cm. long, 3-7 mm. wide; sepals linear, 1-1.5 cm. long; petals none; corona filaments in a single series, filiform, 2.5-3 mm. long, borne at the throat of the tube, erect; operculum not plicate; ovary narrowly ellipsoidal; fruit subglobose, 1.5-2 cm. in diameter.

DISTRIBUTION: Veracruz, Guerrero, and Oaxaca; at low elevations.

VERACRUZ: San Agustín, Liebmann 4136, 4139. Mirador, Liebmann 4134.

LOCAL NAME: "Flor del aresillo."

This is the only one of the tubular passion flowers in the Maya region. Its nearest relatives are all West Indian.

2. *Passiflora trinifolia* Mast. Bot. Jahrb. Engler 8: 217. 1887.

Stem minutely puberulent; stipules ovate-lanceolate to orbicular, 5-8 mm. long, strongly nerved; petioles biglandular near middle; leaf blades coriaceous, glabrous or minutely puberulent, subcordate, 1.5-2.5 cm. long, 2.5-6 cm. wide, 3-lobed to middle, the lobes triangular-ovate; flowers in pairs, 1-2 cm. wide; sepals deltoid-lanceolate, yellowish green; corona filaments in a single series, filiform, dilated toward apex; ovary subglobose.

DISTRIBUTION: Northern Guatemala.

GUATEMALA: Santa Rosa, Baja Verapaz, *Lehmann* 1314 (type); *Türckheim* 1207, II.2368. Cuesta de Cachil, Baja Verapaz, *Pittier* 160.

3. *Passiflora suberosa* L. Sp. Pl. 958. 1753.

Passiflora pallida L. op. cit. 955.

Passiflora hirsuta L. loc. cit.

Passiflora minima L. op. cit. 959.

Plant glabrous to densely pubescent, the lower part of the stem corky; stipules linear-subulate; petioles biglandular above middle, the glands stipitate; leaf blades membranous or subcoriaceous, highly variable in outline, entire to deeply 3-lobed, the lobes narrowly linear to broadly ovate, suberect or widely divergent, acute or obtuse; flowers 0.8-3 cm. wide, solitary or in pairs in the leaf axils; sepals ovate-lanceolate, greenish yellow; petals none; corona filaments in 2 series, filiform, the outer recurved, white, yellow at apex, purple toward base; fruit globose or ovoid, dark purple or black, up to 1.5 cm. in diameter.

DISTRIBUTION: Common throughout tropical America, from southern Florida and southern Texas to Argentina.

VERACRUZ: *Galeotti* 3659, 3661, 3663; *Linden* 751; *Müller* 217; *C. L. Smith* 1388; *Purpus* 2067, 6234, 7128, 15740; *Liebmann* 4124-4133, inclusive; *Gouin* 5.

YUCATAN: *Schott* 898; *Gaumer* 1082, 1304, 2168, 2169, 23606, 23669, 23692, 23971, 24417.

BRITISH HONDURAS: *Gentle* 23, 42.

GUATEMALA: *Lundell* 3844; *Heyde & Lux* 3777; *Deam* 6193; *Lehmann* 2512; *Rodriguez* 1405, 1481.

EL SALVADOR: *Standley* 20188.

LOCAL NAME: "Coceh" (Yucatan).

This is one of the commonest species of *Passiflora* in the American tropics, though apparently it is not so abundant in Mexico and Central America as in the West Indies. It is extremely variable in the shape of the leaves, degree of the indument, and size of the flowers, but no good correlation of characters exists for the recognition of varieties or forms.

4. *Passiflora coriacea* Juss. Ann. Mus. Hist. Nat. 6: 109. pl. 39, f. 2. 1805.

Stem angular; stipules narrowly linear; petioles 2-4 cm. long, biglandular near base, rarely near apex, or 4-glandular, the glands subsessile; leaf blades transversely oblong-elliptic in general outline, sometimes obscurely

3-lobed, but usually truncate or subtruncate along upper margin, up to 7 cm. along midnerve, 7-25 cm. wide, peltate, coriaceous, glabrous; upper inflorescence a terminal raceme, destitute of leaves, with stipules and bract-like biglandular appendages (the petioles of abortive leaves), the lower flowers solitary or usually in pairs in the leaf axils; flowers 2.5-3.5 cm. wide, yellowish green; sepals oblong-lanceolate; petals none; corona filaments in 2 series, the outer filiform, the inner linear; ovary ovoid, glabrous; fruit globose, 1-2 cm. in diameter.

DISTRIBUTION: Mexico, Central America, and northwestern South America to British Guiana, northern Peru, and northern Bolivia, up to 2,000 meters altitude.

VERACRUZ: *Hahn* 106; *Liebmann* 4082, 4083; *Purpus* 5580; *Ervendberg* 211.

TABASCO: *Rovirosa* 212.

YUCATAN: *Gaumer* 23714, 24415; *Lundell* 1210; *Steere* 1888.

BRITISH HONDURAS: *Bartlett* 12011; *Lundell* 636, 3836, 3839, 3841, 3842; *Gentle* 215, 255, 514, 527; *Schipp* 803.

GUATEMALA: *Bartlett* 12270, 12755; *Lundell* 2349, 2439; *Tejada* 248; *Goll* 27; *Deam* 10; *Türckheim* 8215; *H. Johnson* 273; *Standley* 24959, 24014, 24607; *Blake* 7595; *Shannon* 274.

HONDURAS: *Thieme* 5242; *Standley* 52783, 54712, 56658; *Wilson* 256, 533.

EL SALVADOR: *Pittier* 1949; *Padilla* 163; *Standley* 20602, 21306, 22723; *Calderón* 829.

LOCAL NAMES: "Muriciélago," "hoja de murciélago," "ala de murciélago," "media luna," "granadilla del monte."

5. *Passiflora clypeophylla* Mast. Bot. Gaz. 16: 7. 1891.

Plant glabrous throughout; stipules narrowly linear; petioles 2-3 cm. long, biglandular at middle; leaf blades subrotund or obscurely 3-lobed, 7-8 cm. long, 8-10 cm. wide, peltate, membranous, glaucous beneath; peduncles 1.5-2.5 cm. long; flowers 1-1.5 cm. wide; sepals oblong, yellowish green; petals none; corona filaments in 2 series, the outer filiform, the inner linear-clavate; ovary globose.

DISTRIBUTION: Known only from the type locality, in northern Guatemala.

GUATEMALA: Barranca del Rubelacruz, Alta Verapaz, alt. 770 meters, *J. D. Smith* 1625 (type).

6. *Passiflora holosericea* L. Sp. Pl. 958. 1753.

Plant densely pubescent throughout; stem terete, corky below; stipules filiform; petioles biglandular near middle; leaf blades 5-10 cm. long, 4-7 cm. wide, 3-lobed (lobes rounded, the middle lobe much the longer), velvety pubescent above, densely and softly tomentose beneath; peduncles solitary or in pairs in the leaf axils, 2-4-flowered (rarely those in the older axils 1-flowered), the bracts and bractlets subulate; flowers 3-4 cm. wide; sepals ovate-lanceolate, obtuse, densely pubescent without, white, sparingly mottled with red; petals oblanceolate, slightly shorter than the sepals, white, streaked with brown and mottled with red; corona filaments in 2 series, the outer lanceolate, about 7 mm. long, yellow at apex, purple toward base.

the inner capillary, 4-5 mm. long, clavate; ovary obovoid, densely pilose; fruit globose, 1.5 cm. in diameter.

DISTRIBUTION: Mexico to Honduras; Cuba; northern Colombia and Venezuela; up to 700 meters altitude.

VERACRUZ: Baños del Carrizal, *Purpus* 6022. Antigua, *Purpus* 6237. Monserrate, *Purpus* 10025.

GUATEMALA: Gualán, *Deam* 6336. Zacapa, *Deam* 6358; *Kellerman* 7774.

HONDURAS: San Pedro Sula, *Thieme* 5244.

7. *Passiflora adenopoda* DC. Prodr. 3: 330. 1828.

Passiflora acerifolia Schlecht. & Cham. Linnæa 5: 89. 1830.

Ceratosepalum micranthum Oerst. Fl. Cent. Amer. pl. 17. 1863.

Passiflora ceratosepala Mast. in Mart. Fl. Bras. 13¹: 555. 1872.

Passiflora aspera Sessé & Moc. Fl. Mex. 227. 1887.

Stem hispidulous or glabrescent; stipules semi-orbicular, about 1 cm. wide, entire or cuspidate-toothed; petioles 3-5 cm. long, bearing near base 2 opposite orbicular glands 2-4 mm. in diameter, their stipes 6-8 mm. long; leaf blades 7-12 cm. long, 8-15 cm. wide, 3- or 5-lobed, cordate, entire or remotely and minutely denticulate, hispidulous; bracts borne at middle of peduncle, lanceolate or oblong, 7-10 mm. long, 4-6 mm. wide, laciniate; flowers 2-7 cm. wide; sepals oblong-lanceolate, greenish white or yellowish, corniculate; petals linear-lanceolate; corona filaments in a single series, filiform, 1.5-1.8 cm. long, white, purple-banded; ovary oblong or subglobose, densely brown-tomentose; fruit globose, 2-2.5 cm. in diameter.

DISTRIBUTION: Mexico to Venezuela; eastern Peru. Foothills and lower mountain slopes at altitudes of 900 to 1,600 meters.

VERACRUZ: *Liebmann* 4071, 4072; *Müller* in 1855; *Bourgeau* 3168, 3262, 3263; *Purpus* 4337, 6989, 7098; *Conzatti* 12; *Schiede* 85; *Hahn* 1617.

BRITISH HONDURAS: El Cayo, *Chanek* 2.

GUATEMALA: Finca Mocca, *H. Johnson* 80. Tikal, Uaxactun, *Bartlett* 12130. Petén, *Cook & Martin* 142. Cuajiniquilapa, Santa Rosa, *Heyde & Lux* 6143.

8. *Passiflora dolichocarpa* Killip, Journ. Wash. Acad. Sci. 20: 374. 1930.

Plant sparingly hispidulous; stipules semi-ovate, 6-7 mm. long; petioles biglandular below middle, the glands clavate; leaf blades subhastate, 6-10 cm. long, 4.5-7 cm. wide, acuminate, sinuate-dentate, membranous; peduncles in pairs, 3.5-4 cm. long; bracts ovate-lanceolate, 4-5 mm. long, 3-4 mm. wide, oblique, irregularly few-lobed, borne on upper third of the peduncle; flowers about 2.5 cm. wide; sepals oblong, slightly cucullate, white, longitudinally streaked with red or purple within; petals similar to but shorter than the sepals, white; corona filaments in a single series, narrowly linear, 6-7 mm. long, white, banded with red or purple; ovary ovoid, tapering at both ends, stipitate, glabrous; fruit narrowly and acutely obpyriform, about 6 cm. long, including a stipe 1.5 cm. long.

DISTRIBUTION: Known only from the type specimen.

GUATEMALA: Chicavac, Tecpán, alt. 2,500 meters, *Salas* 584 (type).

9. *Passiflora morifolia* Mast. in Mart. Fl. Bras. 13¹: 555. 1872.

Passiflora heydei Killip, Journ. Wash. Acad. Sci. 12: 258. 1922.

Stem glabrate below, sparingly hispidulous above; stipules semi-ovate, long-acuminate; petioles biglandular near apex; leaf blades 4-11 cm. long,

5-15 cm. wide, 3-lobed to below middle (lobes acute, the middle ovate, narrowed at base, the lateral divergent), deeply cordate, repandly dentate or denticulate, membranous, hispidulous with minute hooked hairs above, paler and minutely pilosulous beneath; bracts setaceous; flowers 2-3 cm. wide; sepals linear-oblong, corniculate, white within, mottled with red; petals linear-lanceolate, shorter than the sepals, white; corona filaments in a single series, filiform, white, banded with blue or violet; ovary subglobose, densely pubescent; fruit globose, about 2 cm. in diameter.

DISTRIBUTION: Mexico (?); Guatemala; eastern Peru to Paraguay and Argentina; between 450 and 2,600 meters altitude. Type from Argentina.

GUATEMALA: *Heyde & Lux* 324 (perhaps of same collection as the following). Castillas, Santa Rosa, alt. 1,200 m., *Heyde & Lux* 3772 (type of *P. heydei*).

10. *Passiflora sicyoides* Schlecht. & Cham. Linnæa 5: 88. 1830.

Passiflora odora Link & Otto, Icon. Pl. Rar. 93. pl. 47. 1831.

Stem slender, hispidulous or glabrate; stipules semi-ovate, cuspidate; petioles densely hispidulous, bearing at the middle 2 subopposite stipitate glands; leaf blades 5-8 cm. long, 4-10 cm. wide, 3-lobed (lobes deltoid-acuminate), entire or obscurely denticulate near the cordate base, thin-membranous, light green above, glaucous beneath, minutely hispidulous on both surfaces; peduncles slender, half as long as the petioles; bracts setaceous; flowers 3-4 cm. wide, greenish white; sepals oblong-lanceolate, acute; petals ovate-lanceolate, half as long as the sepals; corona filaments in a single series, narrowly linear, 7-8 mm. long, white, purple-banded; ovary ovoid, stipitate, glabrous; fruit obovoid, tapering to a stipe about 2.2 cm. long.

DISTRIBUTION: Central and southern Mexico, at 1,000 to 1,300 meters altitude.

VERACRUZ: Jalapa, *Schiede & Deppe* (type; also type of *P. odora*); *Barnes, Chamberlain, & Land* 54; *F. W. Johnson* in 1906. Misantla, *Purpus* 6233.

11. *Passiflora obovata* Killip, sp. nov.

PLATE 1.

Scandens, glaberrima; petiolus prope medium biglandulosus, glandulis oblongis, sessilibus; folia obovata vel oblongo-obovata, subabrupte acuminate, integerrima, subcoriacea, venis obscuris; pedunculi bini, bracteis minutis, appressis; sepala oblonga; petala lineari-oblonga; coronæ filamenta biseriata, exteriora ligulata, ad apicem filiformia, interiora capillacea; operculum membranaceum; ovarium globosum.

Vine, glabrous throughout; stem subangular, dark; stipules soon deciduous; petioles about 2 cm. long, biglandular just above middle, the glands scar-like, oblong, about 1 mm. long, sessile; leaf blades obovate or oblong-obovate, 9-12 cm. long, 5-6.5 cm. wide, subabruptly acuminate at apex, slightly narrowed at base, entire, obscurely quintuplinerved (lateral nerves soon anastomosing, the midnerve prominent, the venation not elevated), subcoriaceous, lustrous, dark green; peduncles in pairs, 2.5-3 cm. long, slender, articulate above middle; bracts minute, triangular-ovate, about 0.7 mm. long, acute, closely appressed to the peduncle and borne near its base; flowers about 4 cm. wide, greenish white; calyx tube patelliform; sepals oblong, 1.5 cm. long, 0.8 cm. wide, obtuse; petals linear-oblong, about 1.3 cm.

long, 0.4 cm. wide; corona filaments in 2 series, the outer subequal to the petals, ligulate, filiform toward apex, the inner capillary, about 2 mm. long, minutely capitellate; operculum membranous, 4 mm. high, closely plicate, slightly incurved; limen annular, low; ovary globose.

Type in the herbarium of the Field Museum of Natural History, No. 733,684, collected at "Camp 35," British Honduras Geological Survey, British Honduras, altitude 850 meters, May 20, 1934, by W. A. Schipp (No. 713).

The proposed species occupies an anomalous position in the subgenus *Plectostemma*. Most of the species there have glandless petioles, but there are several, such as *P. suberosa*, *P. bryonioides*, and *P. sicyoides*, which have well-defined glands. In *P. obovata* the glands are almost scar-like, similar to those in the wholly dissimilar subgenus *Astrophea*. In no other respect does this seem closely related to the glanduliferous species of *Plectostemma*, and the very minute bracts, closely appressed to the peduncle near its base, are not characteristic of *Plectostemma*.

12. *Passiflora sexflora* Juss. Ann. Mus. Hist. Nat. 6: 110. pl. 37, f. 2. 1805.

Passiflora pannosa Smith in Rees, Cyclop. 26: *Passiflora* No. 28. 1819.

Stem densely hirsute; stipules linear-subulate; petioles hirsute, glandless; leaf blades 4-7 cm. along midnerve, 5-11 cm. wide, 3-lobed (middle lobe usually shorter than the lateral lobes), rounded or subcordate at base, hirsute or softly pilose above, softly and usually densely villous or tomentose beneath; inflorescence subracemose, the peduncles in pairs in the leaf-axils, 2-10-flowered; bracts linear-lanceolate, 3-5 mm. long, subentire or lacinate; flowers 1.5-3 cm. wide; sepals lanceolate, acute, white within; petals linear, shorter than the sepals, white; corona filaments in 2 series, the outer 8-10 mm. long, white at apex, purple below, those of the inner series half as long, capitellate, purple throughout; fruit globose, 1-1.5 cm. in diameter, densely pubescent.

DISTRIBUTION: Southern Florida and the Greater Antilles; southern Mexico to Colombia.

VERACRUZ: Various localities, *Liebmann* 4121, 4122, 4123; *Linden* 752; *Bourgeau* 1897, 3279; *Purpus* 2065, 10012, 10840; *Kerber* 117.

CHIAPAS: *Purpus* 7294.

GUATEMALA: Dept. of Huehuetenango, *Seler* 3143. Dept. of Alta Verapaz, *H. Johnson* 82, 528; *Türckheim* 686, 8216, II.614, II.1389; *J. D. Smith* 1624; *Lehmann* 1431. Dept. of Baja Verapaz, *Lehmann* 1419; *Türckheim* II.1723. Dept. of Quiché, *Heyde & Lux* 3091. Dept. of Quezaltenango, *Kellerman* 6698.

13. *Passiflora filipes* Benth. Pl. Hartw. 118. 1843.

Plant slender, glabrous throughout; stipules linear-lanceolate, 2-4 mm. long, falcate; petioles 1-2 cm. long, glandless; leaf blades 1-4 cm. long, 2-6 cm. wide, thin-membranous, glaucescent beneath, shallowly 3-lobed, the lobes obtuse or rounded; peduncles very slender, 4-6 cm. long, widely divergent; bracts none; flower 8-15 mm. wide, yellowish green or greenish white; sepals linear-lanceolate; petals narrowly linear, 3-4 mm. long; corona filaments in 2 series, filiform, the outer equaling the petals, the inner shorter; fruit globose, 5-7 mm. in diameter.

DISTRIBUTION: Cameron County, Texas, to Nicaragua; also in Venezuela; up to 900 meters altitude. The locality for the type specimen, *Hartweg* 661, was given as Ecuador. The species is not otherwise known from Ecuador, and the labels attached to some of the specimens of the type collection have had the word "Mexico" crossed off and "Ecuador" substituted. Probably the type actually came from Mexico, where Hartweg also collected.

VERACRUZ: Locoba, *Liebmann* 4115. Mirador, *Liebmann* 4143. Zacuapan, *Purpus* 2295. Baños del Carrizal, *Purpus* 6235.

GUATEMALA: Chocón, *Watson* 244b.

HONDURAS: San Pedro Sula, *Türckheim* 5247.

EL SALVADOR: Ahuachapán, *Standley* 19887, 20024; *Padilla* 4. Sonsonate, *Calderón* 2222.

LOCAL NAME: "Sandillita de pájaro" (El Salvador).

This is closely related to *P. lutea* L., a species widely distributed in the United States.

14. *Passiflora trisetosa* DC. Prodr. 3: 324. 1828.

Passiflora helleri Peyr. Linnæa 30: 34. 1859.

Passiflora fuscinata Mast. in Mart. Fl. Blas. 13¹: 551. 1872.

Stem glabrate or finely pubescent; stipules linear-subulate; petioles glandless; leaf blades subcoriaceous, glabrate, or minutely puberulent on the nerves beneath, ovate-oblong or suborbicular in general outline, 3.5-8 cm. long, 3-7 cm. wide, 3-lobed at apex, the lobes acute or obtuse, the middle lobe usually the largest; peduncles 2-3.5 cm. long, articulate; bracts setaceous, minute; flowers 3-4 cm. wide; sepals oblong-lanceolate, greenish white within; petals narrowly oblong, slightly shorter than the sepals, white, pink-tinged; corona filaments in a single series, 5-7 mm. long, dilated and slightly geniculate on the inner margin just above the middle, green and purple-dotted at margin on outside, purple at margin within; fruit globose, glabrate.

DISTRIBUTION: Veracruz and northern Guatemala, between 1,200 and 1,500 meters altitude, the type presumably collected in Mexico by Sessé and Mociño.

VERACRUZ: Mirador, *Liebmann* 4098 (type collection of *P. fuscinata*); *C. Heller* 160 (type of *P. helleri*); *Purpus* 13064. Zacuapan, *Purpus* 3765, 110670, 11094.

GUATEMALA: Cobán, Alta Verapaz, *Türckheim* II.1618. Pansamala, Alta Verapaz, *Türckheim* 875. Purulá, Baja Verapaz, *Türckheim* II.1724.

15. *Passiflora ornithoura* Mast. Bot. Gaz. 16: 8. 1891.

Passiflora diethophylla Mast. loc. cit.

Plant glabrous throughout; stipules setaceous; petioles 1.5-2.5 cm. long, glandless; leaf blades membranous, cuneate or subrotund at base, deeply bilobed, the lobes narrowly linear to broadly ovate, 3-10 cm. long, 0.5-2 cm. wide, acute or obtuse; peduncles 1-2 cm. long, very slender; bracts setaceous; flowers about 1.5 cm. wide; sepals oblong; petals linear, white; corona filaments in a single series, linear-clavate, barely 2 mm. long; fruit globose, 6-8 mm. in diameter.

DISTRIBUTION: Mountains of western Central America, from Guatemala to Costa Rica, between 1,300 and 1,900 meters altitude.

GUATEMALA: *Lehmann* XVIII. Dueñas, Sacatepéquez, *J. D. Smith* 2136 (type), 2143 (type of *P. dictyophylla*). Capetillo, Sacatepéquez, *J. D. Smith* 2492. Acatepeque, Sacatepéquez, *Heyde & Lux* 4481. San Lucas, Sololá, *Kellerman* 5830.

EL SALVADOR: *Calderón* 2317. Sierra de Apaneca, Ahuachapán, *Standley* 20138; *Padilla* 164, 165, 477.

LOCAL NAME: "Calzoncillo."

16. *Passiflora salvadorensis* Donn. Smith, Bot. Gaz. 42: 297. 1906.

Plant glabrous throughout; stipules filiform; petioles glandless; leaf blades 1-7 cm. along midnerve, 5-15 cm. along lateral nerves, 5.5-11 cm. wide, bilobed 1/3 to 2/3 their length (lobes oblong or ovate-oblong, rounded or acutish, suberect, the sinus often very narrow), rounded or truncate at base, membranous; peduncles up to 5 cm. long, slender; bracts subulate, about 4 mm. long; flowers 2.5-3 cm. wide, greenish white to yellowish green, the sepals and petals linear, the sepals about 3 times longer than the petals; corona filaments in a single series, filiform, about 1 cm. long, purple or purplish red; operculum 3-4 mm. high, erect or suberect, denticulate; fruit globose, about 1 cm. in diameter.

DISTRIBUTION: El Salvador, at 650 to 1,400 meters altitude.

EL SALVADOR: Ahuachapán, *Padilla* 478. San Salvador, *Velasco (J. D. Smith* 8887, type); *Standley* 19279; *Calderón* 810. Cerro del Guayabal, *Calderón* 2004.

LOCAL NAME: "Calzoncillo."

17. *Passiflora yucatanensis* Killip, Field Mus. Bot. 8: 26. 1930.

Stem puberulent; stipules falcate-subulate; petioles 1-1.5 cm. long, glandless; leaf blades truncately 2- or 3-lobed at apex (4-5 cm. long, 6-8 cm. wide) or deeply bilobed, with an obsolescent intermediate lobe (2-4 cm. along midnerve, 5-8.5 cm. along lateral nerves, 6-10 cm. between apices of lobes), membranous or subcoriaceous, minutely puberulous beneath; peduncles solitary, about 3 cm. long, slender; bracts setaceous, 1-2 mm. long; flowers 2.5-3.5 cm. wide; sepals oblong-lanceolate, obtuse; petals similar to the sepals but shorter; corona filaments in 2 series, the outer trigonous, not dilated at middle, 4-5 mm. long, the inner capillary, 2 mm. long; operculum minutely fimbriate; gynophore 1-1.2 cm. long, slender; ovary ovoid, densely white-villous.

DISTRIBUTION: Known only from Yucatan.

YUCATAN: Cozumel Island, *Gaumer* 101 (type). Without locality, *E. P. Johnson*.

Similar in shape of leaves to the common *P. biflora*, this species differs in its floral structure.

18. *Passiflora biflora* Lam. Encycl. 3: 36. 1789.

Passiflora lunata J. E. Sm. Icon. Pl. Rar. 1¹: pl. 1. 1790; Willd. Sp. Pl. ed. 4, 3: 612. 1800.

Passiflora lunata costata Mast. in Mart. Fl. Bras. 13¹: 552. 1872.

Passiflora spathulata Mast. loc. cit.

Passiflora brighami S. Wats. Proc. Amer. Acad. 21: 473. 1887.

Passiflora transversa Mast. Bot. Gaz. 16: 7. 1891.

Plant glabrous or minutely puberulent; stipules linear-subulate or setaceous; petioles 5-10 mm. long, rarely longer, glandless; leaf blades extremely

variable in outline, transversely linear or transversely oblong to suborbicular (ranging from 0.8 cm. long and 8 cm. wide to 10 cm. long and 10 cm. wide) or bilobed, with an intermediate lobe frequently present (lobes lanceolate or ovate, widely divergent or subapproximate, or rounded), truncate, rounded, subcordate, or cuneate at base, coriaceous or subcoriaceous; peduncles in pairs, 1-1.5 cm. long, rather stout; bracts setaceous, about 2 mm. long; flowers 2.5-3.5 cm. wide; sepals ovate-lanceolate, obtuse, green without, white within, somewhat fleshy; petals slightly smaller than the sepals, white, membranous; corona filaments in 2 series, the outer about 7 mm. long, trigonous, dilated above middle, yellow, the inner filiform, about 5 mm. long; operculum closely plicate; gynophore 5-8 mm. long; ovary subglobose or ovoid, glabrous, rarely densely tomentose; fruit globose, 1-2 cm. in diameter.

DISTRIBUTION: Tamaulipas and Sinaloa to Colombia and Venezuela; also in the Bahamas. A common plant from sea-level to 1,500 meters altitude.

VERACRUZ: *Liebmann* 4106-4111, inclusive; *Bourgeau* 2099, 2718; *Hahn* 41, 48; *Seaton* 504; *Purpus* 2066, 7495, 7496, 8905; *Seler* 5131; *Palmer* 416. Mirador, *Liebmann* 4141 (type of *P. spathulata*).

TABASCO: *Rovirosa* 102, 781, 813.

CHIAPAS: *Van Ufford* 33; *Linden*.

CAMPECHE: *Lundell* 1351.

BRITISH HONDURAS: *Bartlett* 11446, 12025, 12074; *Lundell* 1837, 1944, 2271, 2272, 3400, 3835, 3840; *Aguilar* 165; *Gentle* 3, 346, 378, 820, 877; *Peck* 505.

GUATEMALA: *Lehmann* 1422; *Watson* 97 (type of *P. brighami*); *Friedrichsthal* 1188 (type of *P. lunata costata*). Petén, *Bartlett* 12360, 12510; *Lundell* 1490. Alta Verapaz, *Türkheim* 8218. Escuintla, *J. D. Smith* 2083, 2099 (type of *P. transversa*). Izabal, *Standley* 24210, 25125; *Deam* 66.

HONDURAS: *Standley* 53575, 55291, 56827; *Thieme* 5245; *Wilson* 626, 628.

EL SALVADOR: *Standley* 21953.

LOCAL NAMES: "Camacarlata," "calzoncillo" (Central America); "ala de murciélago" (El Salvador).

19. *Passiflora cobanensis* Killip, Journ. Wash. Acad. Sci. 14: 111. 1924.

Stem finely pubescent with curved grayish hairs; stipules lanceolate, subfalcate; petioles 8-10 mm. long, glandless; leaf blades ovate-lanceolate, 7-10 cm. long, 2.5-3.5 cm. wide, attenuate-acuminate, rounded at base, membranous, finely pubescent beneath with curved grayish-brown hairs; peduncles 1.5 cm. long; bracts none; flowers about 2.2 cm. wide, greenish; sepals linear-lanceolate; petals linear; corona filaments in a single series, linear-clavate; ovary obovoid, densely tomentellous.

DISTRIBUTION: Known only from the following collection:

GUATEMALA: Between Chamá and Cobán, Alta Verapaz, 950 meters alt., *H. Johnson* 411 (type).

20. *Passiflora brevipes* Killip, sp. nov.

PLATE 2.

Scandens, ubique dense et brevissime velutina; stipulae lineari-lanceolatae, persistentes; petioli breves, eglandulosi; folia ovato-lanceolata, acuta vel acuminata, cordulata, integerrima, coriacea; bractae nullae; sepala

petalaeque linearia; coronæ filamenta uniseriata, subulata; operculum plicatum; ovarium ovoideum, hexagonum; semina transverse 6-7-sulcata.

Vine, closely short-velutinous throughout; stem triangular; stipules linear-lanceolate, 5-7 mm. long, 1-1.5 mm. wide, coriaceous, persistent; petioles 8-10 mm. long, glandless; leaf blades ovate-lanceolate, 5-8 cm. long, 2.5-4 cm. wide, acute or acuminate, cordulate, entire, thickened at margin, 3-nerved, conspicuously reticulate (nerves and veins elevated beneath), coriaceous, light green when dry; flowers 1-1.5 cm. wide, greenish white, in pairs on the main stem or on short, axillary, nearly leafless branches 4-5 cm. long, the pedicels 4-5 mm. long, bractless; sepals linear, 8-9 mm. long, 2-2.5 mm. wide; petals narrowly linear, 3-4 mm. long, about 1 mm. wide; corona filaments in a single series, subulate, 2.5-3 mm. long; operculum 1 mm. high, plicate, slightly incurved; ovary narrowly ovoid; fruit ovoid, about 4 cm. long, 1.8 cm. in diameter, attenuate at base, short-stipitate, hexagonal; seeds ovate, 4-5 mm. long, 2 mm. wide, transversely sulcate with 6-7 smooth ridges, black, lustrous.

Type in the herbarium of the Field Museum of Natural History, No. 733,685, collected in the Jacinto Hills, British Honduras, altitude 120 meters, March 11, 1934, by W. A. Schipp (No. 1304). Duplicates at the University of Michigan and the Jardin Botanique, Geneva.

This belongs to a small group of species within the subgenus *Plectostemma*, of which the best known are *P. rubra* and *P. capsularis*. The only other species in this group with unlobed leaves is *P. cobanensis*, which differs in indument, shape and texture of the leaves, and shape of the corona filaments.

21. *Passiflora costaricensis* Killip, Journ. Wash. Acad. Sci. 12: 257. 1922.

Plant sparingly to densely hirsute with long brownish hairs; stipules subulate; petioles 1.5-2 cm. long, glandless; leaf blades oblong, ovate, or orbicular-ovate in general outline, 9-13 cm. long, 7-11 cm. wide, rounded at base, 2-lobed, the lobes deltoid, acute or acuminate, ascending, the sinus lunate or nearly semicircular; peduncles solitary, about 1.5 cm. long; bracts none; flowers 4.5-5 cm. wide; sepals linear-lanceolate; petals linear-oblong; corona filaments in a single series, narrowly ligulate, subequaling the petals; ovary minutely puberulent; fruit ellipsoidal, 7-8 cm. long, 1-1.5 cm. in diameter at middle, long-tapering at both ends, at length glabrous.

DISTRIBUTION: Guatemala to Costa Rica, near sea-level.

GUATEMALA: Cubilquitz, Alta Verapaz, *Türckheim* 7877.

HONDURAS: Tela, Atlántida, *Standley* 52806.

22. *Passiflora konzattiana* Killip, Journ. Wash. Acad. Sci. 17: 428. 1927.

Stem slender, pilosulous, at length glabrate; stipules setaceous; petioles 8-20 mm. long, glandless; leaf blades 2-5 cm. long, 3-8 cm. wide, 2-lobed (lobes acute, rarely subobtuse, widely divergent, the sinus lunate, or the upper margin nearly truncate), cordate, sparingly setose above, grayish-pubescent beneath, especially on the nerves and veins; peduncles solitary or in pairs, up to 2 cm. long; bracts none; flowers 1-2 cm. wide, greenish white, densely spotted with red; sepals and petals linear-lanceolate, the petals about half as long as the sepals; corona filaments in a single series,

few, liguliform, 3-4 mm. long, deep red; ovary narrowly ovoid, puberulent or tomentulose; fruit narrowly ellipsoidal, about 5 cm. long and 1 cm. in diameter, 6-angled, at length glabrous.

DISTRIBUTION: San Luis Potosí and Veracruz.

VERACRUZ: Mirador, *Purpus* 8804 (type); *Ghiesbreght* 62; *Linden* 752. Jalapa, 1,200 meters alt., *Rose & Hough* 4260, 4938; *Pringle* 7840; *Schiede*. Tortula, *Liebmann* 4154.

23. *Passiflora rovirosæ* Killip, Journ. Wash. Acad. Sci. 12: 259. 1922.

Stem 5-angled, glabrate, or the younger portions pilosulous; stipules falcate-subulate; petioles 1.5-2 cm. long, glandless, densely pubescent; leaf blades subtruncate-ovate in general outline, 8-15 cm. long, 6-9 cm. wide, deeply cordate, shallowly 2-lobed (lobes suberect, acute), above glabrate, or puberulent on the nerves, grayish villosulous beneath; peduncles 1-1.5 cm. long, in pairs on the main stem or usually on short axillary branches; bracts none; flowers 3-4 cm. wide, yellowish green; sepals and petals linear-oblong; corona filaments in 2 series, the outer filiform, about 1 cm. long, the inner capillary, much shorter; ovary narrowly ovoid, sharply 6-angled, puberulous; fruit ellipsoidal or fusiform, 3-5 cm. long, 1.2-1.5 cm. in diameter at the middle.

DISTRIBUTION: Southeastern Mexico, northeastern Guatemala, and British Honduras, at low elevations.

VERACRUZ: Misantla, *Purpus* 5881. Chinantla, *Galeotti* 3671.

TABASCO: Atasta, *Rovirosa* 813 (type).

BRITISH HONDURAS: Paraiso, *Gentle* 810. Corozal, *Gentle* 434, 608.

GUATEMALA: Uaxactun, Petén, *Bartlett* 12691.

24. *Passiflora capsularis* L. Sp. Pl. 957. 1753.

Passiflora quinquangularis Calderón, *Passiflores Dilobatas* del Salvador 6.

Stem 5-angled, glabrate or pubescent; stipules linear-subulate; petioles 1-3 cm. long, glandless; leaf blades 2-7 cm. along midnerve, 4-10 cm. along lateral nerves, 2-lobed (lobes lanceolate, acute or rarely obtuse, the sinus acute or occasionally truncate at its base), cordate, glabrescent or pilosulous above, densely pubescent beneath; peduncles 1-6 cm. long, slender; bracts none; flowers 2-3.5 cm. wide, greenish white or pale yellow-green; sepals lanceolate, pilose without; petals narrowly oblong-lanceolate, about half as long as the sepals; corona filaments in 1 or 2 series, the outer filiform, 1.2-1.5 cm. long, violet, the inner (sometimes wanting) capillary, barely 3 mm. long, violet; ovary narrowly ovoid, minutely puberulent; fruit ellipsoidal or fusiform, sharply hexagonal, 5-6 cm. long, 1.5-2 cm. in diameter, at length glabrous.

DISTRIBUTION: Greater Antilles; British Honduras to Costa Rica; Colombia; Guianas; central Brazil to Paraguay; at altitudes up to 1,000 meters.

BRITISH HONDURAS: Corozal, *Gentle* 224.

GUATEMALA: Guachipilín, Santa Rosa, *Heyde & Lux* (J. D. Smith 6141). Cuajiniquilapa, *Heyde & Lux* (J. D. Smith 6142).

HONDURAS: *Hjalmarson* in 1852.

EL SALVADOR: San Salvador, *Calderón* 851 (type of *P. quinquangularis*). Ahuachapán, *Standley* 19733; *Calderón* 2438.

LOCAL NAME: "Calzoncillo" (El Salvador).

25. *Passiflora pulchella* H.B.K. Nov. Gen. & Sp. 2: 134. 1817.*Passiflora pulchella bifidata* Mast. Bot. Jahrb. Engler 8: 220. 1887.

Plant glabrous throughout, or the stem minutely pilosulous; petioles glandless; leaf blades deeply bilobed or sometimes obsoletely 3-lobed (lobes divaricate or suberect, truncate, rounded, or bilobate), prominently reticulate, coriaceous; peduncles solitary in the axils, 5-8 cm. long; bracts ovate or suborbicular, 1-1.5 cm. long, 8-10 mm. wide, flabellate-veined, purplish red; flowers 4.5-5.5 cm. wide, blue; sepals oblong; petals ovate-lanceolate or oblong-lanceolate; corona filaments in several series, filiform, the outermost as long as the petals, the others much shorter, capitellate; operculum closely plicate, fimbriate; fruit globose, about 1.5 cm. in diameter.

DISTRIBUTION: Southern Mexico to the northern coast of Colombia and Venezuela; at low elevations.

YUCATAN: Sisal, *Gaumer* 23285. Izamal, *Gaumer* 796. Mérida, *Schott* 405. Chichen Itza, *Steere* 1111. Uxmal, *Steere* 2023.

GUATEMALA: Chiquimula, *Lehmann* 1708 (type of *P. pulchella bifidata*).

EL SALVADOR: Ahuachapán, *Padilla* 161, 161a. La Libertad, *Standley* 23228. Acajutla, *Calderón* 1659.

LOCAL NAMES: "Calzoncillo," "camacarlata," "granadilla" (El Salvador).

This species has the plicate operculum characteristic of the subgenus *Plectostemma* and the foliaceous bracts of the subgenus *Granadilla*.

26. *Passiflora porphyretica* Mast. Bot. Gaz. 20: 538. pl. 36. 1895.

Plant densely pubescent nearly throughout; stipules cordate, 8-10 mm. long, reddish or violet-purple; petioles 1-2.5 cm. long, glandless; leaf blades orbicular in general outline, 5-10 cm. long and broad (those of the branchlets smaller), shallowly 2- or 3-lobed, subrotund or subcordate at base; peduncles in pairs, on the main stem or usually on leafy, axillary branches, the leaves frequently wanting so that the inflorescence appears racemose; bracts broadly cordate, about 10 mm. long and 8 mm. wide, reddish or violet-purple; flowers about 3 cm. wide; sepals and petals linear-oblong, white, the petals about half as long as the sepals; corona filaments in 2 series, filiform; fruit globose, about 1 cm. in diameter.

DISTRIBUTION: Southwestern Mexico to south-central Guatemala, from 400 to 1,300 meters elevation.

GUATEMALA: Jutiapa, 425 meters, *Heyde & Lux* (*J. D. Smith* 6334, type).

27. *Passiflora membranacea* Benth. Pl. Hartw. 83. 1841.

Plant glabrous throughout; stem terete or subangulate; stipules cordate-reniform, 1-1.5 cm. long, obscurely crenulate; petioles 2-4 cm. long, glandless; leaf blades orbicular in general outline, 5-10 cm. long and wide, obscurely 3-lobed at apex, peltate about 5 mm. from base; peduncles solitary, 9-15 cm. long, very slender; bracts broadly cordate-reniform, 3.5-5 cm. long, 2-4 cm. wide, red, purple-red, or rose-color; flowers red; sepals oblong-lanceolate; petals oblanceolate; corona filaments in 2 series, the outer 0.8-1 cm. long, filiform; the inner capillary, barely 2 mm. long, capitellate; oper-

culum closely plicate, lobed one-third its length, the lobes obtuse, minutely fimbriate; ovary narrowly ellipsoidal; fruit oblong, about 4 cm. long and 3 cm. wide.

DISTRIBUTION: Southern Mexico to Costa Rica, at 1,900 to 3,000 meters altitude.

CHIAPAS: *Ghiesbreght* 113, 863. Cerro del Boquerón, *Purpus* 7028.

GUATEMALA: *Savage* in 1846. Cuesta de Argenta, *Hartweg*. Chiul, Quiché, *Heyde & Lux* (*J. D. Smith* 3092). Volcán Santa María, *Nelson* 3728. Quezaltenango, *Vaght* 288. Volcán de Agua, Sacatepequez, *Hartweg* (type); *Maxon & Hay* 3754; *Kellerman* 4773; *Lehmann* 1492. Santa Elena, Chimaltenango, *Skutch* 274.

HONDURAS: *Pimiento*, *Niederlein* 208.

This species presents an unusual assemblage of characters, and its taxonomic position is not readily determined. It has usually been placed in the subgenus *Granadilla*, but appears rather to belong to a monotypic subgenus.

28. *Passiflora hahnii* (Fourn.) Mast. in Mart. Fl. Bras. 13¹: 569. 1872.

Disemma hahnii Fourn. Rev. Hort. 1869: 430. 1869.

Passiflora guatemalensis S. Wats. Proc. Amer. Acad. 22: 473. 1887.

Plant glabrous throughout; stipules reniform, about 1.5 cm. wide, setiferously toothed; petioles 1.5-3 cm. long, glandless; leaf blades broadly ovate-lanceolate in general outline, 5-8 cm. long, entire or usually inconspicuously lobed toward apex, peltate, membranous; peduncles solitary, up to 7 cm. long; bracts 2, cordate, 2.5-3 cm. long, often denticulate toward base; flowers 4-6 cm. wide, white or cream-color; sepals and petals oblong; corona filaments yellow, in 2 series; operculum closely plicate; fruit globose, 3-3.5 cm. in diameter.

DISTRIBUTION: Southern Mexico to Costa Rica; Central Cordillera of Colombia; between sea-level and 1,400 meters altitude.

CHIAPAS: Between Tumbala and El Salto, *Nelson* 3393.

BRITISH HONDURAS: Mountain Pine Ridge, El Cayo District, *Bartlett* 13080. El Cayo, *Chanek* 3.

GUATEMALA: Río Dulce, Chocón, *Watson* 81 (type of *P. guatemalensis*). Yaxha-Ramate road, Petén District, *Lundell* 2015. Tikal District, *Cook & Martin* 67. Izabal, *Watson* 405.

HONDURAS: San Pedro Sula, Santa Bárbara, *Thieme* (*J. D. Smith* 5246). Progreso, *Standley* 54992.

29. *Passiflora cookii* Killip, Journ. Wash. Acad. Sci. 12: 256. 1922.

Plant glabrous throughout; stipules reniform, about 3 cm. wide, crenate, glaucous; petioles 3-4 cm. long, glandless; leaf blades broadly ovate, 7-8 cm. long, 6-7 cm. wide, obscurely lobed above middle (lobes rounded), peltate about 1.2 cm. from base, glaucous beneath; peduncles about 8 cm. long; bracts 2, cordate, about 5 cm. long and 4 cm. wide, entire; flowers 3.5-4.5 cm. wide, white; sepals and petals ovate-lanceolate, subequal; corona filaments in 2 series, the inner much the shorter; operculum plicate, fimbriate; ovary subglobose.

DISTRIBUTION: Known only from the following collections:

VERACRUZ: Río de Puerto Moneda, Sierra Grande del Sur, *Purpus* 10357.

GUATEMALA: Finca Sepacuité, Alta Verapaz, *Cook & Griggs* 593 (type).

30. *Passiflora quadrangularis* L. Syst. ed. 10, 1248. 1759.*Passiflora macrocarpa* Mast. Gard. Chron. 1869: 1012. 1869.

Plant glabrous throughout; stem stout, quadrangular, the angles conspicuously winged; stipules ovate or ovate-lanceolate, 2-3.5 cm. long; petioles 2-5 cm. long, 6-glandular; leaf blades broadly ovate or sometimes ovate-oblong, 10-20 cm. long, 8-15 cm. wide, abruptly acuminate, cordulate or subtruncate, entire, penninerved; peduncles up to 3 cm. long; bracts cordate-ovate, 3-5.5 cm. long, 1.5-4 cm. wide; flowers up to 12 cm. wide; sepals ovate or ovate-oblong, white, violet, or pinkish within; petals similar to the sepals, white, deeply tinged with pink; corona 5-ranked, the 2 outer ranks filamentose, up to 6 cm. long, banded with reddish purple and white at base, blue at middle, densely mottled with pinkish blue in upper half, the third rank tubercular, deep reddish purple, the fourth rank filamentose, banded with reddish purple and white, the inner rank membranous, lacerate; fruit oblong-ovoid, 20-25 cm. long, 12-15 cm. wide, terete or longitudinally 3-grooved.

DISTRIBUTION: Cultivated throughout the American tropics.

CHIAPAS: *Seler* 1969.

GUATEMALA: *J. D. Smith* 1626, 2088, 2466; *Shannon* 447.

EL SALVADOR: *Calderón* 52; *Standley* 19485.

NICARAGUA: *Lévy* 1145; *Tate* 109.

LOCAL NAMES: "Granadilla real," "sandía de la Pasión."

The thick rind of *Passiflora quadrangularis* is often made into preserves; the pulp usually has a pleasant flavor, and is used with or without sugar, or cooked with milk.

31. *Passiflora ligularis* Juss. Ann. Mus. Hist. Nat. 6: 113. pl. 40. 1805.*Passiflora serratistipula* DC. Prodr. 3: 328. 1828; Dess. Fl. Mex. 1: pl. 31. 1874.*Passiflora tiliæfolia* L. sensu Sessé & Moc. Pl. Nov. Hisp. 154. 1887. Not *P. tiliæfolia* L.

Plant glabrous throughout; stem terete; stipules ovate-lanceolate, 1-2.5 cm. long; petioles 4-10 cm. long, bearing 4-6 scattered liguliform or filiform glands 3-10 mm. long; leaf blades broadly ovate, 8-15 cm. long, 6-13 cm. wide, abruptly acuminate, deeply cordate, entire, penninerved; peduncles 2-4 cm. long; bracts 2-3.5 cm. long, connate below middle; flowers 6-9 cm. wide; sepals ovate-oblong, green without, white within; petals oblong, white or pinkish white; corona filaments 5-7-ranked, the 2 outer ranks as long as the petals, terete, blue at apex, banded with white and reddish purple below, the inner rows approximate, barely 2 mm. long; fruit ovoid, 6-8 cm. long, 4-5 cm. in diameter, yellowish or purplish.

DISTRIBUTION: Central Mexico to Venezuela, Peru, and Bolivia; frequently cultivated.

VERACRUZ: Orizaba, *Mueller* 3063.

CHIAPAS: Tumbala, *Nelson* 3326.

GUATEMALA: *Türkheim* 1128. Sumac, Alta Verapaz, *J. D. Smith* 1627. Laguna de Ayarza, Jalapa, *Heyde & Lux* (*J. D. Smith* 3965). San Lopez del Cabo, Sacatepéquez, *Popenoe* 674.

EL SALVADOR: San Salvador, *Calderón* 551. Volcán de San Salvador, *Standley* 22856.

The sweet pulp of *Passiflora ligularis* is used as an ingredient of cooling drinks and sherbets, its flavor generally being considered superior to that of *P. laurifolia* or *P. maliformis*.

32. *Passiflora platyloba* Killip, Journ. Wash. Acad. Sci. 12: 260. 1922.

Plant glabrous throughout except the bracts; stem terete; stipules narrowly linear, 1-1.2 cm. long, coriaceous; petioles biglandular near base, the glands sessile; leaf blades 10-14 cm. long, 12-18 cm. wide, 3-lobed to the middle (middle lobe broadly ovate, 4-8 cm. wide), deeply cordate, finely serrulate; bracts ovate, 5-7 cm. long, connate below the middle, densely puberulent; flowers 4-5 cm. wide, purple; sepals oblong-lanceolate, awned dorsally near apex; petals linear-lanceolate; corona in several series, the outermost filaments filiform, about 7 mm. long, those of the second series stout, liguliform, about 1.5 cm. long, white, banded with purple, the succeeding series of about 6 irregular rows of minute tubercles; operculum denticulate; ovary ellipsoidal; fruit 3-3.5 cm. in diameter.

DISTRIBUTION: Guatemala to Costa Rica, at low elevations.

GUATEMALA: Chiquimula, *Lehmann* 1709 (cited¹ by Masters as *P. velata*).

EL SALVADOR: Tonacatepeque, *Standley* 19487. San Martín, *Calderón* 705.

LOCAL NAME: "Granadilla montés" (El Salvador). The fruit is said to be very acid.

33. *Passiflora nelsoni* Mast. & Rose, Contr. U. S. Nat. Herb. 5: 142. *pl.* 17. 1897.

Plant essentially glabrous throughout; stem terete; stipules oblanceolate, 1-1.2 cm. long; petioles 2-3 cm. long, bearing 2 pairs of sessile saucer-shaped glands near the apex; leaf blades broadly ovate, 9-12 cm. long, 8-9 cm. wide, acuminate, rounded or shallowly cordate at base, penninerved, entire; bracts broadly ovate, 5-6 cm. long, free nearly to base; flowers 5-7 cm. wide; sepals and petals oblong-lanceolate; corona in several series, the outermost filaments subulate, 1-1.5 cm. long, those of the succeeding 5 or 6 series 1-2 mm. long; operculum filamentose; ovary narrowly obovoid; fruit orbicular.

DISTRIBUTION: Southern Mexico and northern Guatemala, at 500 to 1,600 meters altitude.

CHIAPAS: Tumbala, *Nelson* 3325 (type).

GUATEMALA (all from Alta Verapaz): Cobán, *Türckheim* 687. *Tactic, Türckheim* II.2234. Sepacuité, *Cook & Griggs* 781; *Owen* 10.

34. *Passiflora seemanni* Griseb. *Bonplandia* 6: 7. 1858.

Plant glabrous throughout; stem terete; stipules narrowly linear; petioles 3-7 cm. long, biglandular at apex; leaf blades cordate-ovate (rarely 3-lobed), 6-9 cm. long, 5-6 cm. wide, rounded or abruptly acuminate at apex, deeply cordate with the basal lobes much overlapping, minutely denticulate or subentire, glaucous beneath; bracts 2.5-4 cm. long, connate below middle; flowers 8-10 cm. wide, fragrant; sepals ovate-lanceolate, white, tinged with purple or violet; petals oblong-lanceolate, purple; corona 2-ranked, the outer filaments 1-1.2 cm. long, reflexed, white, banded with purple or violet, the inner 2-2.5 cm. long, erect, the interior of the tube lined with tubercles not arranged in definite rows, doubtless rudimentary corona filaments; operculum denticulate; fruit ovoid, 4-5 cm. long, 2.5-3.5 cm. in diameter.

DISTRIBUTION: Southern Mexico and Nicaragua, where perhaps introduced; Panama and Colombia, usually at low elevations.

CHIAPAS: Huehuetán, *Nelson* 3827.

¹ Bot. Jahrb. Engler 8: 219. 1887.

35. *Passiflora serratifolia* L. Sp. Pl. 955. 1753.*Passiflora denticulata* Sessé & Moc. Fl. Mex. 227. 1887.

Stem terete, hirtellous; stipules linear-subulate; petioles 5-12 cm. long, 6-glandular; leaf blades ovate or ovate-oblong, 8-12 cm. long, 4-6 cm. wide, acuminate, rounded or cordulate at base, serrulate, glabrescent above, hirtellous beneath; peduncles solitary, 5-7 cm. long; bracts oblong-lanceolate, 2-3 cm. long, 0.8-1 cm. wide; flowers 4-6 cm. wide, purple-tinged; sepals lanceolate; petals oblong-lanceolate; corona filaments in several series, the outermost filiform, 2-3.5 cm. long, proximally purple, distally white, those of the succeeding 3 or 4 series liguliform, 1-2 mm. long, those of the innermost series 8-10 mm. long; operculum denticulate or subentire; ovary ellipsoidal, glabrous; fruit ovoid or subglobose, 3.5-5 cm. in diameter.

DISTRIBUTION: Eastern Mexico to Costa Rica, at low elevations.

VERACRUZ: *Houston* in 1731 (type); *Liebmann* 4116, 4117, 4118, 4119; *Ervendberg* 226; *Purpus* 15300; *Mell* 523; *Bourgeau* 2229.

TABASCO: *Rovirosa* 129.

CHIAPAS: *Seler* 5493.

BRITISH HONDURAS: *Bartlett* 12082, 13004, 13038; *Lundell* 3931, 3932, 4111, 4739; *Gentle* 427, 454; *Chanek* 42; *Schipp* 143; *Karling* 6; *Peck* 791.

GUATEMALA: *H. Johnson* 59, 563; *Pittier* 174; *Goll* 267.

HONDURAS: *Thieme* 5243; *Standley* 54374, 54764.

LOCAL NAMES: "Injito amarillo" (Tabasco); "amapola," "granadilla del monte" (Central America).

Reports of this species being native in Surinam are probably erroneous.

36. *Passiflora ambigua* Hemsl. Bot. Mag. Curtis 128: pl. 7822. 1902.

Plant glabrous throughout except ovary; stem terete; stipules filiform; petioles 2-3 cm. long, biglandular at or below the middle; leaf blades oblong or ovate-lanceolate, 10-20 cm. long, 5-9 cm. wide, acute or acuminate, rounded or cuneate at base, penninerved, thick-coriaceous; bracts ovate, 3-6 cm. long, 3-4 cm. wide; flowers 8-12 cm. wide; sepals linear-oblong, fleshy, white without, pale pink and punctulate with rose-purple within; petals linear-lanceolate, white, dotted with rose-purple; corona filaments in about 5 series, the outermost slender, 1-1.5 cm. long, banded with red and white, those of the second series coarser, about 5 cm. long, banded with violet and white, the inner filaments in indefinite rows, capillary, about 2 mm. long; operculum crenulate; ovary narrowly ovoid, densely tomentose; fruit ovoid, 10-12 cm. long, 4-4.5 cm. in diameter.

DISTRIBUTION: Southern Mexico to the Canal Zone, at low elevations.

TABASCO: San Juan Bautista, *Rovirosa* 1036.

CHIAPAS: *Endlicher* 1321.

BRITISH HONDURAS: Toledo, *Peck* 810. Machaca, *Schipp* 466, 1302.

GUATEMALA: Sećanquim, *Cook & Doyle* 79. Choctum, Alta Verapaz, *Türkheim* 8211.

HONDURAS: Lancetilla Valley, *Standley* 53289, 54625, 56786a. Cuyamel, *Carleton* 601.

LOCAL NAMES: "Ingo," "jugo," "jujito" (Mexico); "granadilla del monte" (Central America).

This is the representative in Mexico and Central America of the section of *Granadilla* with unlobed entire leaves, small stipules, and free bracts, to which belong the well-known *P. laurifolia*, of the West Indies, and *P. nitida*, of South America.

37. *Passiflora prolata* Mast. Bot. Jahrb. Engler 8: 219. 1887.

Essentially glabrous; stem angular, glabrous or puberulent; stipules linear-setaceous; petioles 1-2 cm. long, 2-4-glandular near the middle; leaf blades 6-12 cm. long, 5-9 cm. wide, 3-lobed to the middle (lobes lanceolate or oblong-lanceolate, caudate), serrulate, glabrous, or finely puberulent beneath; peduncles 3-4 cm. long; bracts free to base, ovate-lanceolate, 4.5-5 cm. long, 1.5-2 cm. wide; flowers about 6 cm. wide; sepals oblong, aristate, white; petals oblong-spatulate, slightly shorter than the sepals, white; corona filaments filiform, purple, in several series, the outermost nearly equaling the petals, the innermost half as long, the numerous intermediate threads very short; operculum filamentose at margin; ovary ellipsoidal, glaucous.

DISTRIBUTION: Known only from Guatemala.

GUATEMALA: Between Dos Arroyos and Yal'och, Petén, *Bartlett* 12840. Sultán, Solalá, *Lehmann* 1630 (type).

This species has long been known only from the type specimen in the Boissier Herbarium and a fragment of it at Berlin. Bartlett's recent material differs from the type only in having a fine indument on the stem and the under surface of the leaves.

38. *Passiflora subpeltata* Ortega, Nov. Rar. Pl. Hort. Matrit. 6: 78. 1798.

Passiflora alba Link & Otto, Icon. Pl. Rar. 65. pl. 33. 1828.

Passiflora adenophylla Mast. in Mart. Fl. Bras. 13¹: 568. 1872.

Passiflora lutea L. sensu Sessé & Moc. Fl. Mex. 228. 1887. Not *P. lutea* L.

Plant essentially glabrous throughout; stem terete; stipules semi-oblong, 1-4 cm. long, up to 2 cm. wide, mucronulate; petioles 4-6 cm. long, 2-4-glandular; leaf blades 3-lobed about to middle, 4-9 cm. long, 5-12 cm. wide (lobes oblong, rounded or obtuse), subcordate and often subpeltate at base, glabrous, or slightly pulverulent above; peduncles 4-6 cm. long; bracts ovate-oblong, 1-1.5 cm. long, cordate, borne just below the base of the flower; flowers 4-5 cm. wide, white or greenish white; sepals oblong, carinate, the keel terminating in a foliaceous awn; petals linear-oblong, about as long as the sepals; corona filaments in 5 series, the 2 outer ones filiform, up to 2 cm. long, radiate, those of the succeeding series erect; operculum denticulate; ovary ovoid; fruit ovoid or subglobose, 2.5-4 cm. in diameter.

DISTRIBUTION: Central Mexico to Guatemala; Panama to Colombia and Venezuela; up to 2,800 meters altitude. Cultivated in the West Indies.

VERACRUZ: Orizaba, *Bourgeau* 2437; *Hahn* 138. Mirador, *Sartorius*. Río de Puerta Moneda, *Purpus* 10362.

GUATEMALA: Huehuetenango, *Schumann* 1566. Amatitlán, *J. D. Smith* 1919.

LOCAL NAME: "Granada de zorra" (Mexico).

This species has usually passed as *P. alba*, the earlier name *P. subpeltata* having been overlooked or wrongly associated with some other species. Ortega based the description of *P. subpeltata* on a plant which was grown from seeds sent by Sessé and Mociño from Mexico, perhaps obtained from the Cuernavacan plant which they misidentified as *P. lutea*. The type, now in the Madrid Herbarium, and a specimen of Sessé and Mociño's in the Boissier Herbarium agree perfectly with the rest of the specimens cited above.

Specimens from Brazil and Argentina have been referred to *P. alba*, but actually they represent allied species.

39. *Passiflora œrstedii* Mast. in Mart. Fl. Bras. 13¹: 562. 1872.

Passiflora purpusii Killip, Journ. Wash. Acad. Sci. 12: 261. 1922.

Stem slender, glabrous; stipules semi-ovate, 1-3.5 cm. long, 5-15 mm. wide, caudate; petioles 1-4 cm. long, 4-6-glandular, the glands stipitate; leaf blades ovate-lanceolate to narrowly oblong-lanceolate, 6-13 cm. long, 3-9 cm. wide, acute or obtuse, rarely asymmetrically 2-lobed or 3-lobed to below the middle (lobes lanceolate or oblong-lanceolate, the middle one sometimes narrowed at base), cordulate or rounded, glabrous above, glaucous and glabrous or densely hirtellous beneath with matted hairs; peduncles 2-4 cm. long; bracts ovate-lanceolate, 1-1.5 cm. long, cordulate, borne 5-10 mm. below the base of the flower; flowers 4-6 cm. wide; sepals ovate-lanceolate, short-awned, white within; petals linear, white or pinkish; corona filaments purple, in 5 or 6 series, those of the outer 2 series filiform, radiate, 1.5-2 cm. long, those of the succeeding 2 or 3 series erect, 1.5-2 mm. long, the innermost ones linear-clavate, 3 mm. long; operculum filamentose nearly to base; ovary ovoid, glabrous; fruit ovoid, 4-6 cm. long, 2-3 cm. in diameter.

DISTRIBUTION: Veracruz to Venezuela and Colombia, up to 1,800 meters altitude.

VERACRUZ: Zacuapan, *Purpus* 3689, 7664 (type of *P. purpusii*). Misantla, *Galeottii* 3674.

The type of this species, collected in Costa Rica by Oersted, has narrowly oblong-lanceolate, glabrous leaves. No material from the Mayan area exactly matches it, but in view of the large series of specimens now available I believe that the plant described as *P. purpusii* is merely a variant of it with the leaves pubescent on the under side. Material from Guatemala and Honduras differs from typical *P. œrstedii* in having the leaves prevailingly 3-lobed, and is best treated as a variety:

39a. *Passiflora œrstedii choconiana* (S. Wats.) Killip.

Passiflora choconiana S. Wats. Proc. Amer. Acad. 22: 474. 1887.

Leaves prevailingly 3-lobed.

TABASCO: Atasta, *Rovirosa* 781.

BRITISH HONDURAS: Machaca, *Schipp* 1215. Toledo, *Peck* 663.

GUATEMALA: Río Chocón, *Watson* 212 (type of *P. choconiana*). Dept. of Alta Verapaz, *Türckheim* 545, 986, 2480, 7745, 8213, II.188; *Goll* 270; *H. Johnson* 93, 471, 511. Panzal, Baja Verapaz, *Türckheim* II.1725.

HONDURAS: Lancetilla Valley, *Standley* 52914. Río Esperanza, *Wilson* 445. Cuyamel, *Carleton* 436.

40. *Passiflora urbaniana* Killip, Journ. Wash. Acad. Sci. 17: 426. 1927.

Plant ferruginous-villous or tomentose nearly throughout; stem terete; stipules semi-annular, minute; petioles 5-10 mm. long, glandless; leaf blades oblong-lanceolate or lanceolate, 4.5-9 cm. long, 2-4 cm. wide, obtuse or rounded at apex, cordulate, entire or remotely undulate-crenulate, coriaceous or subcoriaceous, the nerves impressed above; bracts 2-3.5 cm. long, 1-1.5 cm. wide, viscous, deeply bipinnatisect, the segments gland-tipped; flowers

about 5 cm. wide; sepals oblong, dorsally corniculate, white (?); petals linear, slightly shorter than the sepals; corona filaments in 5 series, those of the 2 outer filiform, about 1.3 cm. long, violet at base, radiate, the inner ones capillary, about 2 mm. long, erect; operculum erect, minutely denticulate; ovary subglobose densely white-villous; fruit globose, about 3.5 cm. in diameter, villous; seeds oblong-cuneate, about 4 mm. long and 3 mm. wide, shallowly tridentate, finely reticulate.

DISTRIBUTION: British Honduras, the type from a plant cultivated at Santiago de las Vegas, Cuba, said to have been introduced from British Honduras.

BRITISH HONDURAS: Churchyard Pine Ridge, Sibun River, *Gentle* 1826.

The type of this species (*Baker* 2588) has been widely distributed to herbaria. Though said to be a native of British Honduras, the species was not known from that country until collected on February 25, 1936, by *Gentle*.

41. *Passiflora palmeri* Rose, Contr. U. S. Nat. Herb. 1: 131. pl. 14. 1892.

Low flat-topped viscous shrub about 50 cm. high, with short tendril-bearing, densely pilose branches; stipules semi-annular, deeply cleft into filiform gland-tipped divisions; petioles 1-1.5 cm. long, bearing numerous coarse gland-tipped hairs; leaf blades 1-3 cm. long, 2-4 cm. wide, deeply 3-lobed (lobes orbicular, rounded), cordate, serrulate, densely glandular-ciliate; bracts 2-4 cm. long, 8-12 mm. wide, deeply bipinnatisect into capillary gland-tipped segments; flowers 6-7 cm. wide; sepals linear, about 3.5 cm. long, white; petals linear, 2-3 cm. long, white; corona filaments in several series, those of the 2 outer erect, capillary, barely 2.5 mm. long, deep blue to purple, the tips paler, the succeeding series consisting of minute threads about 0.5 mm. long; operculum minutely denticulate; ovary subglobose, densely white- or brown-villous; fruit globose, 2.5-3 cm. in diameter, pilose.

DISTRIBUTION: Lower California; represented in the Mayan region by the following variety:

41a. *Passiflora palmeri* sublancoolata Killip, var. nov.

Folia sublancoolata, acuta, lobis lateralibus multo reductis; bractæ quam in forma typica angustiores; flores rubri.

Leaf blades lanceolate in general outline, 3-5 cm. long, 2-3.5 cm. wide, the basal lobes much reduced; bracts 8-10 mm. wide; flowers "bright scarlet" or "rose-red."

Type in the U. S. National Herbarium, No. 1,492,638, collected between Uaxactun and San Clemente, Department of Petén, Guatemala, April 30, 1931, by H. H. Bartlett (No. 12788). Duplicate in the herbarium of the University of Michigan.

DISTRIBUTION: Southeastern Mexico and northeastern Guatemala.

CAMPECHE: Tuxpeña, *Lundell* 1352.

YUCATAN: Chickankanab, *Gaumer* 23671.

Dysosmia is taxonomically one of the most difficult subgenera of *Passiflora*, owing mainly to the high degree of variation exhibited by the principal species *P. foetida*. In addition to *P. foetida* ten species may be recognized, all of which are of rather local distribution. These are: *P. clathrata* and

P. lepidota, of Brazil; *P. fruticosa* and *P. arida*, from Lower California and northwestern Mexico; *P. palmeri*; *P. urbaniana*, from British Honduras; *P. chrysophylla*, from Paraguay, Uruguay, and Argentina; *P. pectinata* and *P. bahamensis*, from Bermuda and the Bahamas; and an undescribed one from Amazonian Peru.

42. *Passiflora fœtida* L. Sp. Pl. 959. 1753.

Herbaceous vine, ill-odored, glabrous throughout, or with a variable indument; stipules semi-annular about the stem, deeply cleft into filiform gland-tipped divisions; petioles up to 6 cm. long, glandless; leaf blades cordate at base, membranous, 3- or 5-lobed, the degree of lobation and the shape of the lobes highly variable; peduncles solitary, up to 6 cm. long; bracts involucrate, 2-4-pinnatifid or -pinnatisect, rarely once-pinnatifid, the ultimate segments filiform, gland-tipped; flowers 2-5 cm. wide, white, pink, lilac, or purplish; sepals ovate-oblong or ovate-lanceolate, awned dorsally just below the apex; petals oblong, oblong-lanceolate, or oblong-spatulate, slightly shorter than the sepals; corona filaments in several series, those of the 2 outer series filiform, about 1 cm. long, the others capillary, 1-2 mm. long; operculum erect, denticulate; fruit globose or subglobose.

DISTRIBUTION: Throughout the American tropics, and frequently introduced into other tropical regions.

Passiflora fœtida, considered in the broadest sense, is a highly variable species, and were one's knowledge confined to a few specimens representing the extremes of variation, each would unquestionably be treated as a separate species. But in the preparation of a monograph of the American Passifloraceæ I have examined several thousand sheets of "*P. fœtida*," and have reached the conclusion that the prevailing concept of this as a polymorphic species is the correct one. However, it is possible to recognize many varieties, though admittedly the line of differentiation between them is not always a sharp one.

Passiflora fœtida is represented in the Linnaean Herbarium by a single specimen, one which was in Linnaeus' hands in 1753. This should be taken as the type, especially as its leaves agree perfectly with the leaf figured in the *Amoenitates*,¹ and the excellent description given by Linnaeus in the *Philosophia Botanica*² applies well to this specimen. This is the variant to which Masters assigned³ the name *P. fœtida* var. *hirsuta*, and apparently does not occur in the Mayan region. Material from this area is highly variable, more so, perhaps, than in any other region of similar size.

KEY TO VARIETIES OF *P. FÆTIDA*

Ovary pubescent a. *gossypifolia*
Ovary glabrous.

Stem hispid-hirsute with hairs at least 2 mm. long.

Under surface of leaves appressed-hirsute b. *hastata*

¹ *Amoen. Acad.* 1: pl. 10, f. 19.

² *Philosophia Botanica*, p. 260.

³ *Mart. Fl. Bras.* 13¹: 583. 1872.

- Under surface of leaves softly lanuginous, hirsute on the nerves and veins.
- Ultimate segments of bracts not closely interwoven; styles glabrous c. *lanuginosa*
- Ultimate segments of bracts closely interwoven; styles pilose d. *hirsutissima*
- Stem densely and softly villous or pilosulous with hairs less than 2 mm. long, or glabrous.
- Leaves pubescent on one or both surfaces.
- Stem softly villous or pilosulous e. *mazoni*
- Stem glabrous or very sparingly pilose.
- Leaves subhastate, the basal lobes more than half as long as the middle lobe, usually bilobate f. *subpalmata*
- Leaves strictly hastate, the basal lobes less than half as long as the middle lobe, not bilobate.
- Under side of leaves densely and softly pilosulous; basal lobes broadly ovate or orbicular in general outline g. *mayarum*
- Under side of leaves hirsutulous; basal lobes oblong in general outline h. *salvadorensis*
- Leaves glabrous.
- Basal leaf lobes much longer than wide i. *ciliata*
- Basal leaf lobes slightly, if at all, longer than wide, or wanting.
- Leaves definitely hastate j. *nicaraguensis*
- Leaves narrowly lanceolate, the basal lobes not evident. k. *subintegra*

42a. *Passiflora fœtida gossypiifolia* (Desv.) Mast. in Mart. Fl. Bras. 13¹: 582. 1872.

Passiflora gossypiifolia Desv. in Hamilt. Prodr. Pl. W. I. 48. 1825.

Plant villosulous or hirsutulous throughout, often viscous, the indument grayish or yellowish brown, very short; leaf blades averaging 5 cm. long and 5 cm. at greatest width (basal lobes usually semicircular in outline, sometimes abruptly narrowed to an obtuse point), undulate or crenate-serrulate; bracts 2-3 cm. long, twice- or thrice-pinnatisect, the ultimate filiform segments gland-tipped, straight or nearly so, not closely interwoven; ovary sparingly to densely pilosulous, the hairs persisting in fruit; fruit 2-2.5 cm. in diameter, yellow or greenish yellow, red-spotted.

DISTRIBUTION: Cuba, Hispaniola, and Jamaica; Mexico, Central America, and South America.

VERACRUZ: *Bilimek*; *Purpus* 6236; *Botteri* 996.

TABASCO: *Rovirosa* 559.

CHIAPAS: *Goldman* 748; *Purpus* 9258.

YUCATAN: *Gaumer* 793, 1964, 23291, 23355, 23582, 23639; *Schott* 240, 292; *Steere* 1437, 1554.

BRITISH HONDURAS: *Gentle* 223; *Schipp* 1154.

GUATEMALA: *Savage* 69. Dept. Izabal, *Standley* 23968, 25125. Dept. Zacapa, *Kellerman* 7663. Dept. Guatemala, *Tonduz* 760; *Rodriguez* 2001. Dept. Escuintla, *J. D. Smith* 1986. Dept. Amatitlán, *J. D. Smith* 1948; *Kellerman* 4779; *Rodriguez* 2259.

HONDURAS: *Standley* 54480, 56861; *Wilson* 528; *Niederlein* 209; *Peck* 922.

EL SALVADOR: *Pittier* 1953, 1966; *Standley* 19727, 20817, 21633, 21901, 22476, 23444; *Calderón* 198, 634.

This is the plant well illustrated by Plumier, and is the commonest form from Mexico to Salvador. The indument, though dense, is much finer and softer than in typical *P. fœtida* and the width of the leaves is usually sub-

equal to the length. In the plants of Hispaniola and Jamaica the indument is brownish; in those from Cuba and the continent prevailingly grayish and more viscous.

42b. *Passiflora fœtida hastata* (Bertol.) Mast. in Mart. Fl. Bras. 13¹: 583. 1872.

Passiflora hastata Bertol. Pl. Guatim. 427. 1840; Walp. Repert. Bot. 2: 221. 1843.

Plant not viscous, densely hirsute throughout with long yellowish hairs; leaves hastate (midnerves: lateral nerves, about 5:2-2.5, the middle lobe lanceolate or oblong-lanceolate, acute or acuminate, the lateral lobes ovate, rounded or acute), the hairs of the leaves closely appressed; bracts 3-3.5 cm. long at post-anthesis; ovary glabrous; fruit 2.5-3 cm. in diameter.

DISTRIBUTION: Southeastern Mexico to Guatemala.

VERACRUZ: *Liebmann*, *Passiflora* Nos. 45, 51. Papantla, *Liebmann*, *Passiflora* No. 46. Tantoyuca, *Ervendberg* 158b. Zacuapan, *Purpus*. Córdoba, *Bourgeau* 2336. Veracruz, *Schnée* in 1894; *Seler* 5116.

BRITISH HONDURAS: Mountain Pine Ridge, *Bartlett* 11927.

GUATEMALA: Morales, *Deam* 6028. Cajval, *Pittier* 234. Sehachichá, *Türckheim* 8214. Chamá, *H. Johnson* 175. Retaluléu, *Bernoulli & Cario* 2821.

Although I have not seen the type of *P. hastata*, *Pittier*'s 234 agrees best with the description. Among variants of *P. fœtida* in Mexico and Central America this comes closest to the typical form.

42c. *Passiflora fœtida lanuginosa* Killip, var. nov.

Caulis pilis aureo-brunneis longis divaricatis hispido-hirsutus; folia hastata vel subhastata, supra ferrugineo-hirsutula, infra molliter lanuginosa et in venis hirsuta; bractearum segmenta ultima elongata; ovarium glabrum.

Stem hirsute with divaricate golden-brown hairs about 2 mm. long, rarely shorter; leaves hastate or subhastate (midnerves: lateral nerves, about 2:1), above ferruginous-hirsutulous, sometimes also hirsute, beneath softly lanuginous, hirsute on the nerves and veins; bracts 1.5-5 cm. long, the ultimate segments filiform, usually elongate, not closely interwoven; ovary glabrous; fruit 2-3 cm. in diameter, yellowish.

Type in the U. S. National Herbarium, No. 1,012,914, collected at Mirador, State of Veracruz, Mexico, by F. M. Liebmann (No. 4096; *Passiflora* No. 53).

DISTRIBUTION: Tamaulipas to British Honduras and Guatemala.

VERACRUZ: *Liebmann* 4088, 4090-4093, 4097. Jalapa, *Pringle* 7823. Zacuapan, *Purpus* 2064. Orizaba, *Bourgeau* 2438. Córdoba, *Orcutt* 3350. Mirador, *Purpus* 8805; *Galeotti* 3660.

CHIAPAS: Ocozaquanlilla, *Seler* 2119.

CAMPECHE: Tuxpeña, *Lundell* 1034.

BRITISH HONDURAS: Belize River, *Lundell* 3843. El Cayo, *Chanek* 1.

GUATEMALA: La Libertad, Petén, *Lundell* 2227. Lake Petén, *Lundell* 3125.

The leaves of the type specimen are very densely lanuginous, more so than in the case of most of the other specimens cited.

42d. *Passiflora foetida* *hirsutissima* Killip, var. nov.

Ubique dense lanuginoso-hirsuta; folia subhastata, lobo medio ovato vel oblongo-ovato, abrupte acuto; bractea tripinnatisecta, segmentis ultimis conferte intertextis; ovarium glabrum.

Plant densely lanuginous-hirsute throughout; leaves subhastate (midnerve: lateral nerves, 5:3), the middle lobe ovate or oblong-ovate, abruptly acute; bracts about 2 cm. long at anthesis, thrice-pinnatisect, the ultimate segments closely interwoven; flowers about 2.5 cm. wide, pale pink, the sepals and petals densely spotted with deep pink within; ovary glabrous.

Type in the U. S. National Herbarium, No. 1,405,900, collected at Sepacuité, Alta Verapaz, Guatemala, October, 1901, by Mary W. Owen (No. 9).

DISTRIBUTION: Known only from the type locality.

The indument is denser than in most other varieties of *P. foetida*; the bracts are closely interwoven, in this respect resembling *P. foetida hispida*, a common plant of the West Indies.

42e. *Passiflora foetida* *maxoni* Killip, var. nov.

Caulis molliter pilosus; folia crenulata, pilosula, hastata vel subhastata, lobo medio oblongo-lanceolato, acuminato, lobis lateralibus ovato-lanceolatis, saepe bilobatis; bractearum segmenta ultima non conferte intertexta; ovarium glabrum.

Stem softly pilosulous with hairs up to 1 mm. long; leaves hastate or subhastate (midnerve: lateral nerves, 5:3-4; middle lobe oblong-lanceolate, acuminate, the lateral lobes ovate-lanceolate, usually bilobate, acute or subacute), crenulate, pilosulous; bracts 3-3.5 cm. long at post-anthesis, the ultimate segments not closely interwoven; flowers 2.5-3 cm. wide, pale purple; ovary glabrous; fruit 2.5-3 cm. in diameter.

Type in the U. S. National Herbarium, No. 1,180,248, collected along the shore of Lake Managua, near Managua, Nicaragua, June 24, 1923, by William R. Maxon (No. 7219).

DISTRIBUTION: El Salvador and Nicaragua.

EL SALVADOR: *Renson* 259. Department of San Salvador, *Standley* 22608, 22763, 23278.

NICARAGUA: Corinto, *Tonduz* in 1921.

This and two other varieties of Mexico and Central America often have the basal lobes bilobate, so that the leaves appear 5-lobed. The pubescence of this variety is like that of *gossypifolia*, and the large purplish flowers are like those of several of the following varieties.

42f. *Passiflora foetida* *subpalmata* Killip, var. nov.

Caulis glaber; folia 3- vel 5-lobata, supra hirsutula, subtus pilosula; bractearum segmenta ultima non conferte intertexta; ovarium glabrum.

Stem slender, glabrous; leaves subhastate (midnerve: lateral nerves, 5:3, the basal lobes oblong in general outline, subobtuse, usually bilobate), hirsutulous above, pilosulous beneath; bracts about 2 cm. long at anthesis, the ultimate segments not closely interwoven; ovary glabrous.

Type in the U. S. National Herbarium, No. 1,494,002, collected at Progreso, State of Yucatan, Mexico, Aug. 11-15, 1932, by W. C. Steere (No. 3022). Other collections, all from Yucatan, are *Steere* 3021, *Gaumer* 23979 and 24251.

42g. *Passiflora foetida mayarum* Killip, var. nov.

Caulis glaber vel sparsissime pilosus; folia hastata vel subhastata, lobis rotundatis vel subacutis, lateralibus late ovatis, supra subappresso-hirtella, subtus dense at molliter ferrugineo-pilosula; bractearum segmenta ultima non conferte intertextata; ovarium glabrum.

Stem slender, glabrous or very sparingly pilose; leaves hastate or subhastate (midnerve: lateral nerves, 5:2 or 5:2.5), the lateral lobes broadly ovate or suborbicular, rounded or rarely subacute), subappressed-hirtellous above, densely and softly ferruginous-pilosulous beneath; bracts up to 4 cm. long, the ultimate segments not closely interwoven; sepals and petals cream-colored, the corona purple and white; ovary glabrous; fruit 2-2.5 cm. in diameter, red.

Type in the U. S. National Herbarium, No. 1,493,061, collected along the Belize-Sibun road, Belize District, British Honduras, by P. H. Gentle (No. 6). Gentle's 39 from the same locality is also this.

BRITISH HONDURAS: *Gentle* 157. Corozal, *Lundell* 1897; *Gentle* 126. Belize, *Lundell* 1836, 3837, 3838.

42h. *Passiflora foetida salvadorensis* Killip, var. nov.

Caulis glaber; folia hastata, lobis subacutis, supra appresso-hirsuta, subtus hirsutula; bractearum segmenta ultima non conferte intertextata; ovarium glabrum.

Stem slender, glabrous; leaves hastate (midnerve: lateral nerves, 5:1.5-2, the lobes subacute), appressed-hirsute above, hirsutulous beneath; ultimate segments of bracts not closely interwoven; flowers purple; ovary glabrous; fruit about 2.5 cm. in diameter.

Type in the U. S. National Herbarium, No. 1,137,761, collected in the vicinity of Nahulingo, Department of Sonsonate, alt. 220 meters, March 21, 1922, by P. C. Standley (No. 22006). Represented also by *Standley* 22209 and *Pittier* 1966, from the same department.

LOCAL NAME: "Sandía de culebra."

42i. *Passiflora foetida ciliata* (Dryand.) Mast. in Mart. Fl. Bras. 13¹: 583. 1872.

Passiflora ciliata Dryand. in Ait. Hort. Kew. 3: 310. 1789.

Plant glabrous throughout except for a few gland-tipped cilia on the petioles and at the leaf margins; leaves subhastate (midnerve: lateral nerves, 5:2-3; lobes narrowly oblanceolate or narrowly oblong-lanceolate, the length much exceeding the width, acute or acuminate), subtruncate or cordate at base, finely denticulate; bracts bi- or tripinnatisect, 3-4 cm. long, the ultimate segments not closely interwoven; flowers 4-5 cm. wide, light blue or pale pink; fruit when ripe 2.5-3.5 cm. in diameter, scarlet or bright red.

DISTRIBUTION: Southern Mexico and northern Guatemala; Jamaica.

CAMPECHE: Campeche, *Seler* 4947. El Carmen, *Mell* 2016.

YUCATAN: *Gaumer* 127, 466, 630; *Schott* 292. Mérida, *Schott* 983. Chichankanab, *Gaumer* 1783. Progreso, *Gaumer* 23355. Silam, *Gaumer* 1888. La Vega, *Goldman* 631. Chichen Itza, *Steere* 1089.

GUATEMALA: San Clemente, Petén, *Bartlett* 12832.

42j. *Passiflora foetida nicaraguensis* Killip.

Passiflora hastata nicaraguensis Killip ex Standl. Field Mus. Bot. 10: 293. 1931.

Plant glabrous throughout; leaves hastate (midnerve: lateral nerves, 5:2-2.5; lobes rounded to subacute), ciliate; bracts 3-4 cm. long at time of fruit, the ultimate segments not closely interwoven; flowers purplish white; fruit 2.5-3 cm. in diameter, scarlet (?).

DISTRIBUTION: Southern Mexico to Nicaragua.

TABASCO: Río Gujalva, *Rovirosa* 560.

BRITISH HONDURAS: Corozal, *Gentle* 379. Belize, *Lundell* 3933.

GUATEMALA: Champerico, Retalulú, *Kellerman* 4969. Escuintla, *J. D. Smith* 2016.

HONDURAS: La Fragua, Atlántida, *Standley* 52665 (type, U. S. Nat. Herb. 1,406,059). Tela, *Yuncker* 4668.

Passiflora foetida nicaraguensis merges into several other varieties, e.g., *maxoni*, *mayarum*, and *ciliata*. The plant was first described in an account of the Flora of the Lancetilla Valley, Honduras, the description being derived from a specimen from that region, to which I had given the name *P. hastata nicaraguensis*. At the time this sheet was submitted to me I was inclined to separate several species from *P. foetida*, and had at hand a number of Nicaraguan specimens which I considered to belong to the same subspecies as the Lancetilla sheet. In the present treatment, in which *P. foetida* is taken in a broader sense but its varieties are separated on finer lines, most of the Nicaraguan specimens fall into other varieties. To avoid perpetual confusion I am selecting the specimen from La Fragua, Honduras, as the type, this locality being the only one cited at the place of original publication.

42k. *Passiflora foetida subintegra* Killip, var. nov.

Ubique glabra; folia anguste lanceolata vel obscure hastata, acuminata, undulata; flores rosei; fructus ruber.

Plant glabrous throughout; stem black, wiry; leaves narrowly lanceolate or obscurely hastate, 4-6 cm. long, 1-2 cm. wide, acuminate, undulate; bracts about 2 cm. long at anthesis, the ultimate segments not closely interwoven; flowers dark rose; fruit scarlet.

Type in the herbarium of the University of Michigan, collected at All Pines, British Honduras, Sept. 12, 1930, by W. A. Schipp (No. 648). Duplicate at Geneva.



Passiflora obovata Killip, sp. nov. The type specimen (Schip 713), at half natural size.



Passiflora brevipes Killip, sp. nov. The type specimen (Schipp 1304), at half natural size.





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